

This Book presents a field guide to the snakes of India. It is intended to create and further an interest in Indian snakes. It describes concisely thirty of the common species of Indian snakes, venomous and nonvenomous, and makes easy identification possible through clear photographs. The main text provides a key and an authoritative account of size, distribution, habits, habitat, food and status of each snake.

The subsequent chapters discuss some of the general facts about snakes, symptoms and remedies of snakebite and statistics of snakebite. The book also includes a checklist of the snakes in India, a list of vernacular snake names, a rainfall chart and a key to the identification of snakes.

Romulus Whitaker is at present Director of the Madras Snake Park and Honorary Director of the Madras Crocodile Bank Trust. He first came to India in 1951 for his schooling and returned later to start the Madras Snake Park in 1969. He also started the Madras Crocodile Bank Trust in 1974. Mr. Whitaker is acknowledged as an expert on Indian snakes. He is also the author of two booklets, *Dangerous Snakes of India* and *Endangered Reptiles of India*.

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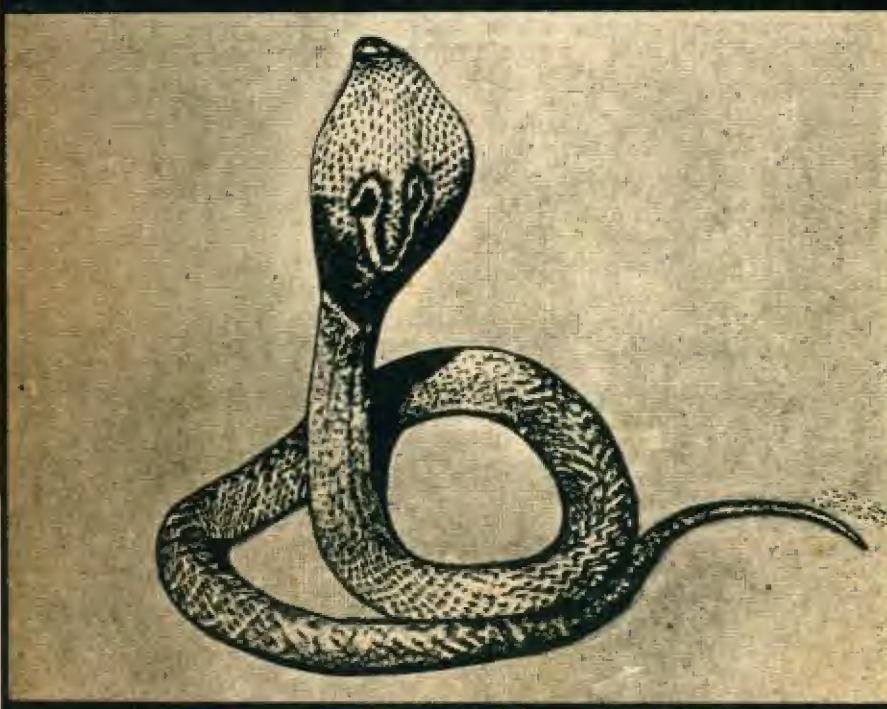
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Romulus Whitaker
**COMMON
INDIAN
SNAKES**
A Field Guide



COMMON INDIAN SNAKES
A Field Guide

To
my friend
Natesan
remembering his humour and jungle lore

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‘...the terror occasioned by those numerous reptiles, is immediately aggravated by the indiscriminate apprehension of all being poisonous. To distinguish, therefore, those that are really so, from such (by far the greatest number) as are harmless, becomes a matter next in importance to the discovery of a remedy against their poison.’

PATRICK RUSSELL

*An Account of Indian Serpents Collected
on the Coromandel Coast, 1796*

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Foreword

Snakes are intrinsically fascinating and form an important component of the biota. It is natural that their curious mode of propulsion, their venom and their constricting mechanisms have made them a most important group of predators, the interaction of which maintains the natural balance in the forests and deserts, the plains and hills of India. The advent of man appears to have increased their importance, as tea plantations and paddy fields, village hut and city godown provided new opportunity for worms and insects, frogs and birds, rats and mice, many of which increased in the areas they occupied and became pests.

Such expansion, and also such changes in their food supply apparently caused shifts in the kinds and density of snake populations as well. In many situations, this appears to be desirable as the increased number of snakes started to control the pests and with this protected the food supply. However, some snakes are poisonous and even non-poisonous ones may be kept in awe. For that matter, we know very little about the kinds of snakes occurring in each area and the actual changes that have taken place in snake populations with increased cultivation and the use of chemical fertilizer and pesticide. Furthermore, we lack information about those snakes that have been unable to survive the total destruction of natural habitats and about the role these snakes once played in maintaining a balance between pests and crops. Finally we know that some of the rarer snakes (and some of the common ones) produce compounds and venoms of great interest and value for the study of disease. They thus have an economic, as well as a scientific interest.

For all of these reasons, one welcomes the appearance of a simple guide to the common snakes of India and hopes that it will

provide the impetus for additional study. As more workers observe the animals in the field and as we learn about the behaviour of particular species we not only contribute to the overall fund of human knowledge, but also provide the basis for informed decisions about the management of the land that ultimately form the basis of our existence.

*University of Michigan
Ann Arbor*

CARL GANS

Preface

There are over 2000 species of snakes in the world of which more than 200 ranging in size from 100 mm worm snakes to 6 m long pythons, are found in India. These snakes occur in most habitats: from the warm seas to deserts, swamps, lakes, farmlands, up into the mountains where some live even at the foot of glaciers 5,000 metres high in the Himalayas.

This book does not attempt to describe all Indian snakes. It deals with 30 representative forms, most of which might be encountered by an average citizen of India (including the Andaman and Nicobar Islands), as well as with a few species of special importance in one or another region. Many of the snakes treated here also occur in neighbouring countries; however, description and ranges are given for India alone. Emphasis is on species common to the Indian peninsula, with less attention paid to the forms of the Himalayas and the extreme northeast (Assam).

It is hoped that this volume fulfills the need for a simple means of identifying Indian snakes through photographs, descriptions of the animals, and characterization of their ecology and habits. Snakes are very important economically, destroying many rodents. Unfortunately, some of the most useful are also of concern medically because of their venoms. Beyond this snakes are basically fascinating animals, as witness their appearance in the superstitious and religious lives of most of the population.

Most people are admittedly, and quite unnecessarily, afraid of snakes. It is hoped that the present slim volume will help stir up some popular interest in this group of reptiles.

I am grateful to a number of persons for assistance in preparing this book. A great part of the snake collection work and field study over the past eight years have been carried out by our associates of the Irula tribe, whose knowledge of the natural history of

snakes is truly amazing. Our snakes have been cared for and observations recorded by several Snake Park staff, notably Solomon Pushparaj and M. Mani. Mr A. N. Jagannatha Rao, our honorary secretary, has been of great help always, ever since the initiation of the Madras Snake Park in 1969. I am grateful to my mother and family for encouraging my interest in reptiles. Thanks are due to Harry Miller for introducing me to the Irulas, Dr. Sherman A. Minton for the use of his key to the snakes, and Dr. H. Alistair Reid for reading and commenting on the snakebite chapter. The Indian Meteorological Bureau in Madras kindly supplied the rainfall data.

I am indebted to Prof. Carl Gans for his critical appraisal of the manuscript and the section on locomotion. I am also grateful to Mr. J. C. Daniel, Curator of the Bombay Natural History Society, who contributed a number of invaluable suggestions; to Sheldon Campbell and the late Charles E. Shaw for the use of drawings from their book *Snakes of the American West*; Drs. Yoshio Sawai and M. Homma for their snakebite data; and, lastly, I am deeply grateful to my wife Zahida, who edited and typed the many drafts of this book.

Madras Snake Park Trust
January 1978

The Nonvenomous Snakes



Common Worm Snake

HARMLESS

1. Common Worm Snake

Typhlina bramina

DISTINCTIVE FEATURES: Small, wormlike; smooth, shiny scales; blunt head and tail; no pattern.

AVERAGE LENGTH: 12.5 cm; *At Birth:* 3.5 cm; *Maximum:* 17 cm (Beaked Worm Snake: 60 cm).

DESCRIPTION: Common Worm Snakes are reddish-brown or black, and their widely overlapping smooth scales have an iridescent sheen. Superficially they look like earthworms. The tail is similar to the blunt head, but bears a tiny spine; the eyes are barely visible dots and covered by scales. The underside is usually lighter. Magnification is needed to show the scales and tongue to prove them to be miniatures of the snake world. This is the commonest of our 14 species of worm snakes (or blind snakes). They are the smallest of Indian snakes and very little is known about them. Some people call them primitive or 'degenerate', but these snakes are highly specialized for underground survival, and their sensory behaviour and mechanics of movement are of great interest to scientists. Until recently, the scientific name of the Common Worm Snake was *Typhlops braminus*; then it was discovered that the genus included several subgroups.

DISTRIBUTION: Throughout India including the Andamans. The only snake reported from Lakshadweep Islands. Up to 1000 m above sea level in Indian hill ranges.

HABITAT: Worm snakes live underground in ant and termite nests. They are also found under logs, moist leaves and humus in wet forests, dry jungle and even city gardens.

HABITS: This species turns out to be all-female and parthenogenetic. Apparently, common worm snakes have many enemies and only come to the surface at night. When handled, they exude an unpleasant smelling musk, at the same time poking

with their tail-point in a convincing act of 'mock stinging'. The musk lets other worm snakes know of their presence and acts as an ant and predator repellent.

YOUNG: This snake lays 5-8 self-fertilized eggs; the time of egg-laying in India is not known.

FOOD: Evidently worms, the soft-bodied larva and eggs of ants and termites, tunnels of which they occupy. Captive worm snakes at the Madras Snake Park have fed on earth worms.

STATUS: The distribution and survival of this group of snakes directly reflects soil humidity and temperature. Since deforestation has become rampant in India, it is likely that some of the forest species of worm snakes will not survive.

REMARKS: Common Worm Snakes are possibly the world's most widely distributed snakes. Carried around the world in flower pots (by accident), they have colonized even the snakeless islands like Lakshadweep, New Zealand and Hawaii.

HARMLESS

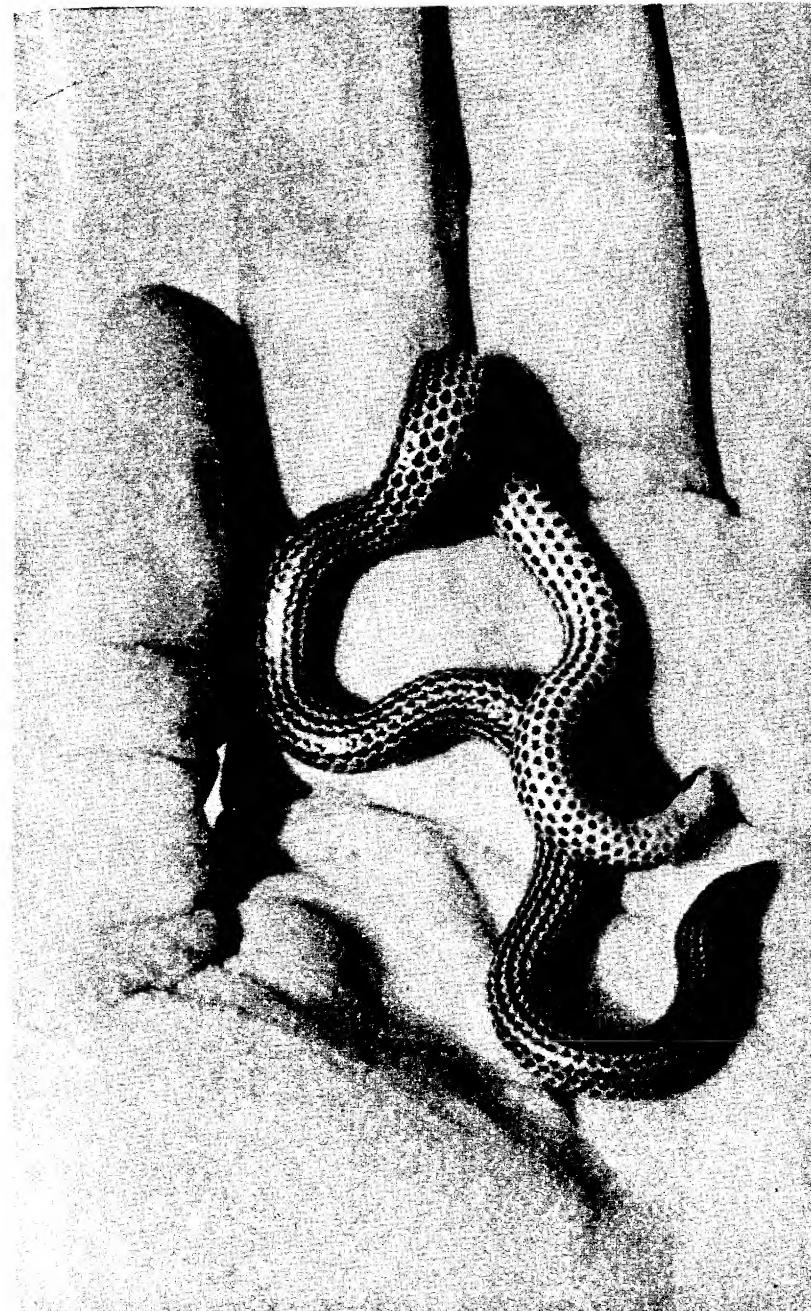
2. Perrotet's Shieldtail Snake

Plectrurus perroteti

DISTINCTIVE FEATURES: Small; pointed head and blunt tail; smooth, glossy scales; generally brightly marked underside.

AVERAGE LENGTH: Up to 44 cm; diameter 11 mm.

DESCRIPTION: Perrotet's Shieldtail is brown; each scale has a reddish or yellowish centre. The underside of the tail is orange and the young usually have a yellow line on the top of the tail. All uropeltids have powerful, pointed heads and tiny eyes. The tail is short and blunt and ends in two small points. The glowing iridescence of these snakes is best seen when the snake is put in sunlight, but is actually due to specializations of the scales that keep the dirt from sticking to it. Shieldtails are often mistaken for earthworms; however, unlike earthworms, almost



Perrotet's Shieldtail Snake

all species have brightly marked undersides. Perrotet's Shieldtail is one of the 43 shieldtails or uropeltids of the hills of South and Central India and Sri Lanka.

DISTRIBUTION: Western Ghats, south of Goa. According to M.A. Smith, this species is common in the Nilgiris and Anaimalais. Other species are found at their particular altitude and habitat preferences throughout the Western Ghats. The distribution of these snakes needs considerable revision.

HABITAT: Uropeltids are forest snakes, occupying tunnel systems generally in the leaves, humus, rocks and logs of most forests, 10-30 cm below the surface of the soil. At drier times of the year they may burrow much deeper.

HABITS: Being burrowers, uropeltids spend almost all the time underground. They may move to the surface at night and we have found them active when it rains. These snakes refuse to bite when handled.

YOUNG: Shieldtails produce 3-5 living young.

FOOD: They apparently feed on earthworms and insect larva which they will take in captivity.

STATUS: With the ever-increasing destruction of the hill forests the shieldtails and countless other smaller, little-known forest creatures are likely to become extinct before we have learned anything about their biology.

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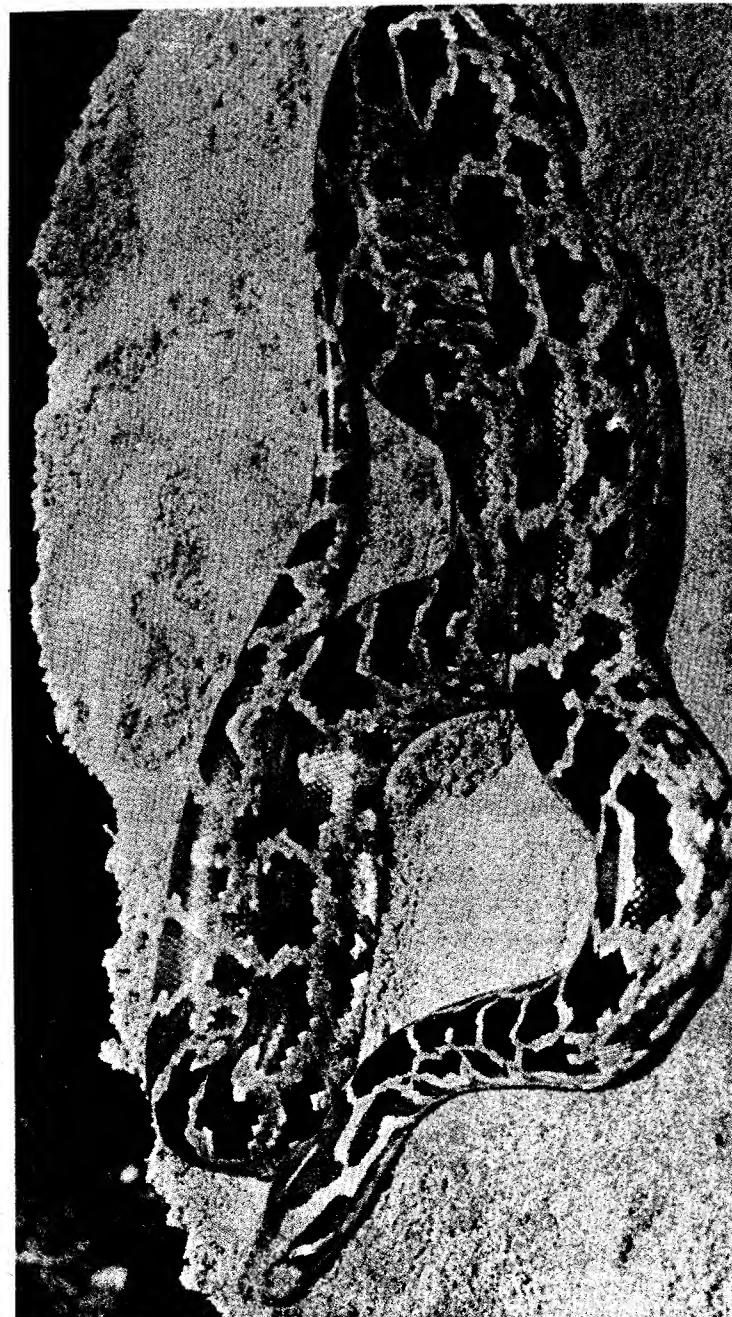
3. Indian Rock Python

Python molurus

DISTINCTIVE FEATURES: Large, thick-bodied; smooth scales; bright, blotched pattern.

AVERAGE LENGTH: 3 m; **At Birth:** 50 cm; **Maximum:** 6 m.

DESCRIPTION: The Indian Rock Python is a heavy-bodied, smooth-scaled snake with a lance-shaped head and short tail. The bright,



Indian Rock Python

blotched pattern may be yellowish to dark brown. Pythons of the hill forests of the Western Ghats and Assam are darker, and those of the Deccan and East Coast are usually lighter. The underside is whitish, yellowish or light orange. Pythons have 'spurs', which are vestigial legs on either side of the anal vent. These are larger in males. These snakes are equipped with heat sensors, small slits near the nostrils, similar in function to the 'pits' of the pit vipers. The other species of python found in India, the Regal Python (*Python reticulatus*) grows to over 10 metres and is probably the largest snake in the world. It is reported from the Nicobars.

DISTRIBUTION: Throughout most of India. Pythons are found in estuarine mangrove forests, arid scrub jungle and the cool dense rain forests upto 2000 m above sea level.

HABITAT: Though able to adapt to many types of environment, pythons require large undisturbed areas to hunt and hide in. They live in rocky clefts and caves, abandoned mammal burrows, hollow trees, dense water reed and mangrove thickets, usually near a permanent water source.

HABITS: Pythons sleep or bask in the sun during the daytime. At night, they prowl in search of prey or lie in wait near a water-hole or a regular mammal pathway. Very large pythons seem reluctant to move far and often establish a territory and a favoured residence. After a heavy meal, they become sluggish and may rest for several days or even weeks during digestion. One captive python fasted for over two years. In captivity they become tame if well cared for.

YOUNG: Between March and June, the female lays upto 100 eggs, often the size of duck eggs (sometimes considerably larger) in a safe, undisturbed hole, cave or hollow and remains coiled on them for 60 to 80 days. She may contract her body muscles rhythmically, thus incubating the clutch, affording temperature and humidity control and protection.

FOOD: Pythons feed mainly on warm-blooded prey ranging in size from mice and birds to jackals, civets and even deer and wild boar. They stalk prey stealthily, striking suddenly and tightening around the victim. Pythons do not crush their prey but restrict respiration and heart beat. There is no authentic case of a human being eaten by one in India. Where common, pythons are extremely valuable predators on agricultural pests.

STATUS: Pythons are killed throughout their range for the fine skin; thus, this beautiful snake is now locally extinct in many areas. They are now partly protected by the Government of India and python skin export is banned. In Kerala and Tamil Nadu, Poliyars and other tribals eat python meat and the fat is favoured in many areas for purported medical uses.

HARMLESS

4. Common Sand Boa

Eryx conicus

DISTINCTIVE FEATURES: Short, thick-bodied; keeled scales; very rough tail; conspicuous, blotched pattern.

AVERAGE LENGTH: 50 cm; **At Birth:** 12.5 cm; **Maximum:** 1 m (female).

DESCRIPTION: The overall colour of the Common Sand Boa varies from yellowish-white to dark brown, with irregular blotches of reddish-brown to black forming an uneven chain down the back. They are stumpy snakes with a very rough tail and a square nose. Superficially, they resemble the Russells Viper; the spots of the latter however are uniform and round.

DISTRIBUTION: Common throughout India on the plains and low hills but rare or absent in most parts of Bengal and Assam.

HABITAT: Sandy soil, rat burrows, brick piles and rocky areas are favoured.

HABITS: Common Sand Boas are mainly nocturnal, and hunt after dark for fresh rodent burrows or lie in wait, with head and neck out of a hole, for a passing rodent. We have seen this technique used successfully in the morning hours after sun-up, when birds and lizards are caught. This snake is timid when first caught, but gets used to gentle handling. The initial defence stance is coiling and quick upward bites which can be surprising and slightly painful but which are, of course, absolutely harmless. The Sand Boas typically hide the head beneath the body when

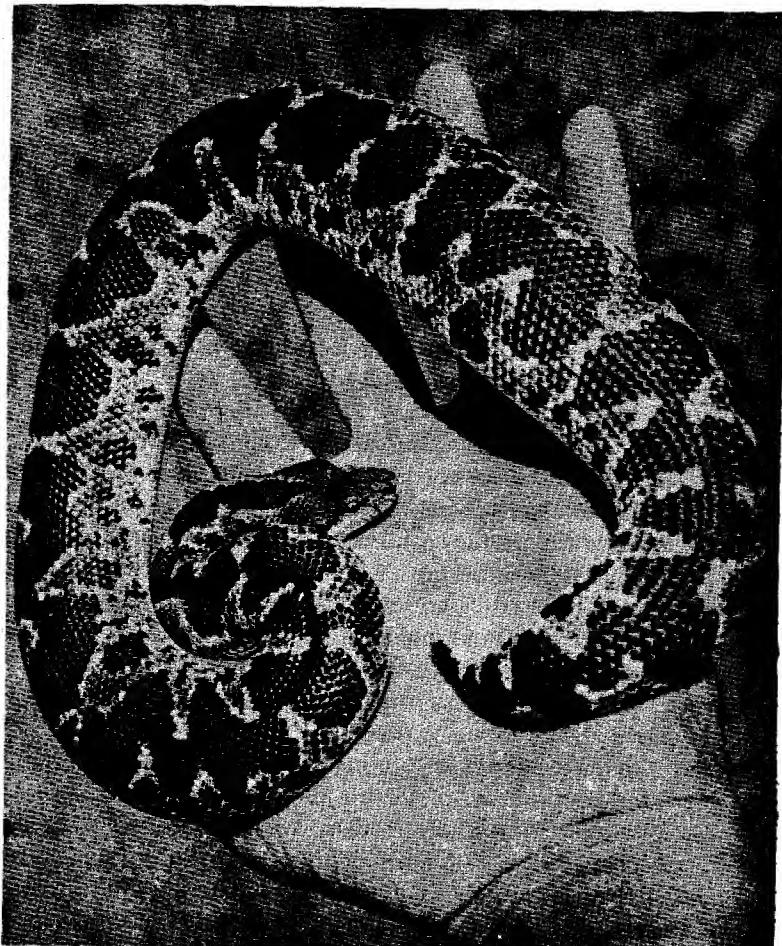
provoked. Though less of a digger than the Red Sand Boa, this snake also prefers sandy soils for easy burrowing.

YOUNG: Females give birth to 6 to 8 living young May through July. The young are bright replicas of the parents, and resemble saw-scaled vipers slightly.

FOOD: Adult Common Sand Boas eat rats, but hatchlings first feed on insects, mice, small lizards and snakes; they graduate to birds, larger lizards and rodents. All kill their prey by constriction.

STATUS: Though effective rodent controllers, Common Sand Boas have been extensively killed for their skins, which are called 'baby python' by dealers.

REMARKS: In some areas of India it is foolishly believed that the bite or lick of this Sand Boa causes leprosy or a similar skin disease. The origin of this story may have been the snake's mottled skin pattern.



Common Sand Boa

HARMLESS

5. Red Sand Boa

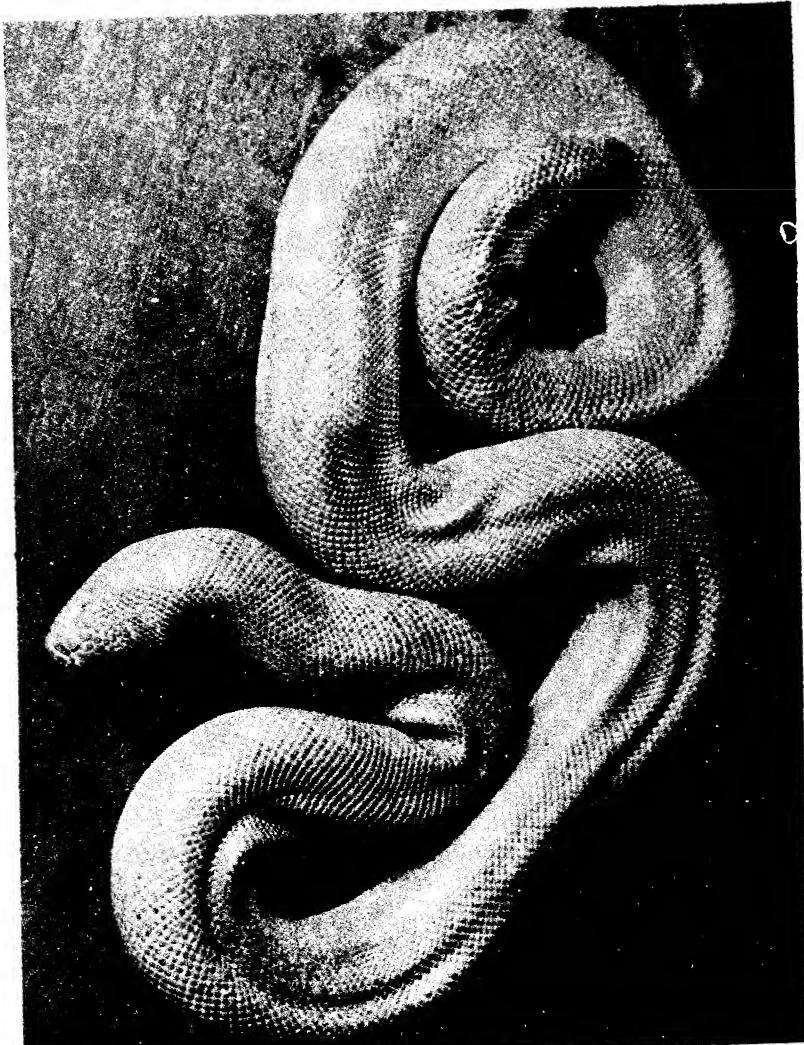
Eryx johnii

DISTINCTIVE FEATURES: Medium-sized, with very blunt tail and head; keeled scales; no pattern.

AVERAGE LENGTH: 75 cm; **At Birth:** 22 cm; **Maximum:** 1 m.

DESCRIPTION: The overall colour of the Red Sand Boa varies considerably, from reddish-brown and speckled-grey or yellowish to black. The thick body is well adapted for burrowing. The Red Sand Boa is one of the oddest looking snakes of India. The shovel-shaped nose and a tail so blunt that it appears to have been chopped off make them easy to recognize. Therefore, they are often called 'two-headed snakes' in vernacular languages and are favourites of the snake-charmer.

DISTRIBUTION: Throughout the drier parts of India. Common in



Red Sand Boa

Tamil Nadu, Andhra Pradesh and the north-west. A plains' snake.

HABITAT. Prefers sandy places and often lives in rodent burrows.

HABITS: This is a nocturnal snake. They are docile and unlike Common Sand Boas, will not bite when handled, but just try to hide the head under their body coils. With the head securely tucked under, the boa's tail may wave about and distract the tormentor. The effectiveness of this ruse is obvious from the high percentage of scarred and mangled tails one sees.

YOUNG: The female gives birth to 6 to 8 living young around June. The young are distinctly banded.

FOOD: Diet and method of killing prey is similar to that of the Common Sand Boa. Red Sand Boas feed on other snakes with fair regularity. They are one of the few snakes that can penetrate the blocked burrows of the Mole Rat, a notorious rice destroyer.

STATUS: Red Sand Boas are lucky enough to have remained off the skin dealer's list, and are also apparently favoured by the ever increasing desert regions of India.

HARMLESS

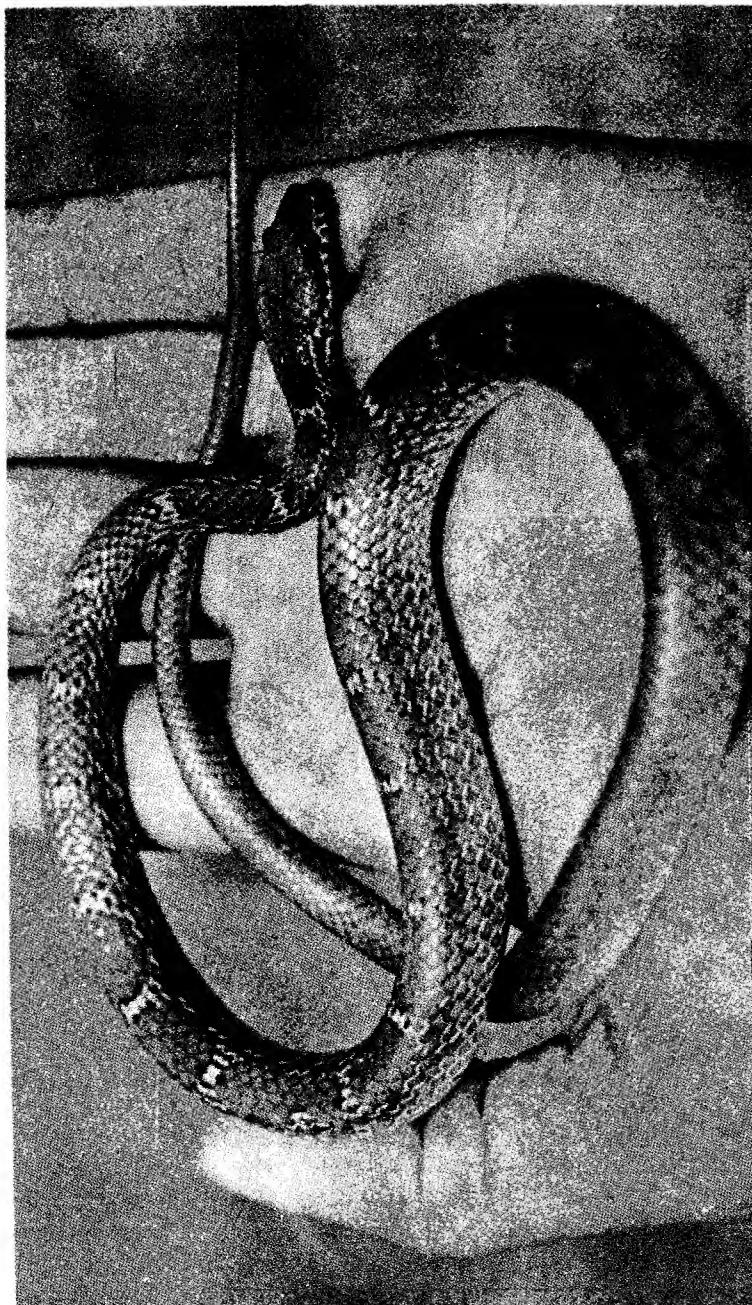
6. Common Wolf Snake

Lycodon aulicus

DISTINCTIVE FEATURES: Small, slender, with or without bright cross bands; smooth shiny scales; protruding black eyes.

AVERAGE LENGTH: 30 cm; *At Birth:* 14 cm; *Maximum:* 80 cm.

DESCRIPTION: Common Wolf Snakes are grey, brownish or black with 10-20 thin white or yellow bands. The jet-black eyes protrude slightly and the pupil is invisible. Small specimens have translucent skins so that the internal organs can be easily seen from the underside. The head is flattish and somewhat pointed, the scales are smooth and slightly glossy. The unmarked



Common Wolf Snake

underside is white. These are small and often brightly marked 'house' snakes which sometimes share human dwellings. There are eight species of wolf snakes in India.

DISTRIBUTION: Throughout India, including the Andamans and Nicobars, up to over 2,000 m in the hills.

HABITAT: In and around caves, stone piles, hollow trees, under bark and other dry, secure places. Man's convenient mud, brick and cement 'caves' are attractive habitats, with abundant geckos to feed on.

HABITS: Common Wolf Snakes seem to be strictly nocturnal and are never seen out during the day. They are great climbers and can easily cling to fairly smooth walls and tree trunks. When first handled, wolf snakes usually bite with micro-ferocity. A nip from a big one can be quite painful. The long front teeth which give them the name may be mistaken for fangs unless carefully examined.

YOUNG: 5-7 eggs are laid in December-January in the Madras region. The young have bolder and brighter patterns than the adults.

FOOD: Adults have a preference for skinks and geckos, though they probably also eat small lizards and frogs. The long front teeth help in gripping the prey, which is swallowed alive.

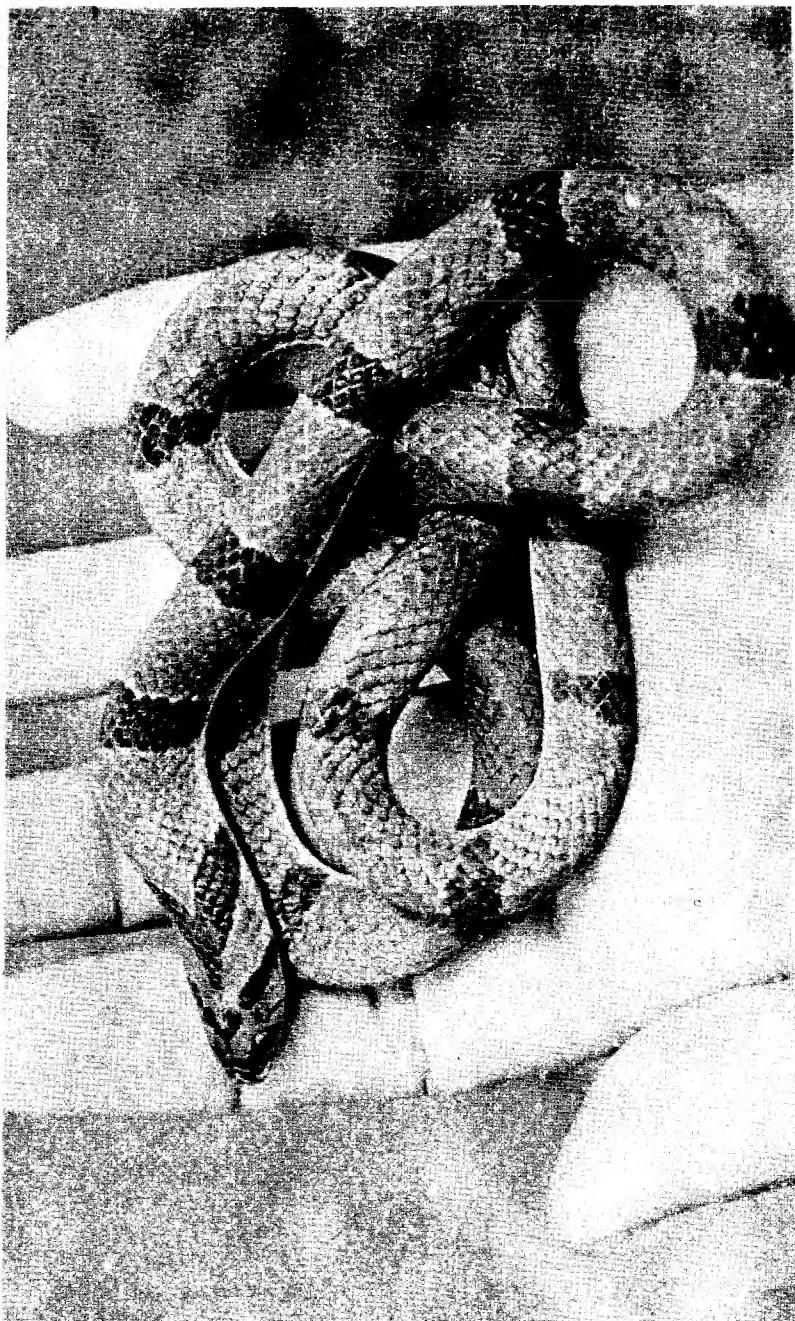
STATUS: Wolf Snakes are often mistaken and killed as 'kraits'. Though common, they are nowhere abundant. It is sad that most college and school preserved specimens requirement lists seem to include them.

HARMLESS

7. Banded Kukri

Oligodon arnensis

DISTINCTIVE FEATURES: Small; smooth, glossy scales; prominent cross bands and distinctive chevron mark on top of the head.



Banded Kukri

AVERAGE LENGTH: 35 cm; *At Birth*: 8 cm; *Maximum*: 64 cm.

DESCRIPTION: Banded Kukris are reddish or greyish-brown with 10-20 black or dark brown bands. The top of the head has a distinct chevron or arrowhead design. The underside is white. The scales are smooth and glossy, head thin with a blunt tip, eyes round-pupilled. Kukri snakes get their name from their sharp, curved teeth, perfect for holding strong prey such as geckos. Banded Kukris are the most common of the 34 kukri snakes of Asia which range from southern Asia to southern China and some Malayan islands. Russell's Kukri is another common species; though varying in colour and pattern, it has the typical chevron head marking of a Kukri.

DISTRIBUTION: Throughout India. The White-barred Kukri of Assam is found upto 2000 m in the hills.

HABITAT: Though sometimes found in termite mounds, Banded Kukris, like the wolf and cat snakes, are mainly cave, crevice and tree-hole dwellers, that find old broken houses especially suitable.

HABITS: Out and active on cool rainy nights. Almost never bites, its main defence being to stiffen and jerk when provoked, as do kraits.

YOUNG: Banded Kukris generally lay 3 to 6 eggs. Baby Kukris appear in Madras in September.

FOOD: Geckos, skinks and small mice. According to M.A. Smith, they are particularly fond of bird and reptile eggs. The tiny offspring feed on insects, their larvae and spiders.

STATUS: Although rarely seen and nowhere abundant, this is a fairly common snake. Because of the banded pattern, they are often mistaken for kraits and killed.

HARMLESS

8. Striped Keelback

Amphiesma stolata

DISTINCTIVE FEATURES: Small, keel (rough) scaled; two distinctive yellow stripes down back.

AVERAGE LENGTH: 40 cm; *At Birth:* 9 cm; *Maximum:* 80 cm (female).

DESCRIPTION: Striped Keelbacks are closely related to and resemble the watersnakes. They are, in fact, quite at home in water and have long rear teeth for catching frogs. The overall colour is light or dark brown with two tan or yellow stripes running down the body length. These stripes are especially bright on the last half of the body. The head is light brown, and the sides of the head, lip area and chin are white or yellow. In the Madras area, a smaller, slightly different type occurs, which has wide, black lines behind each eye. This is the common 'grass snake' of India.

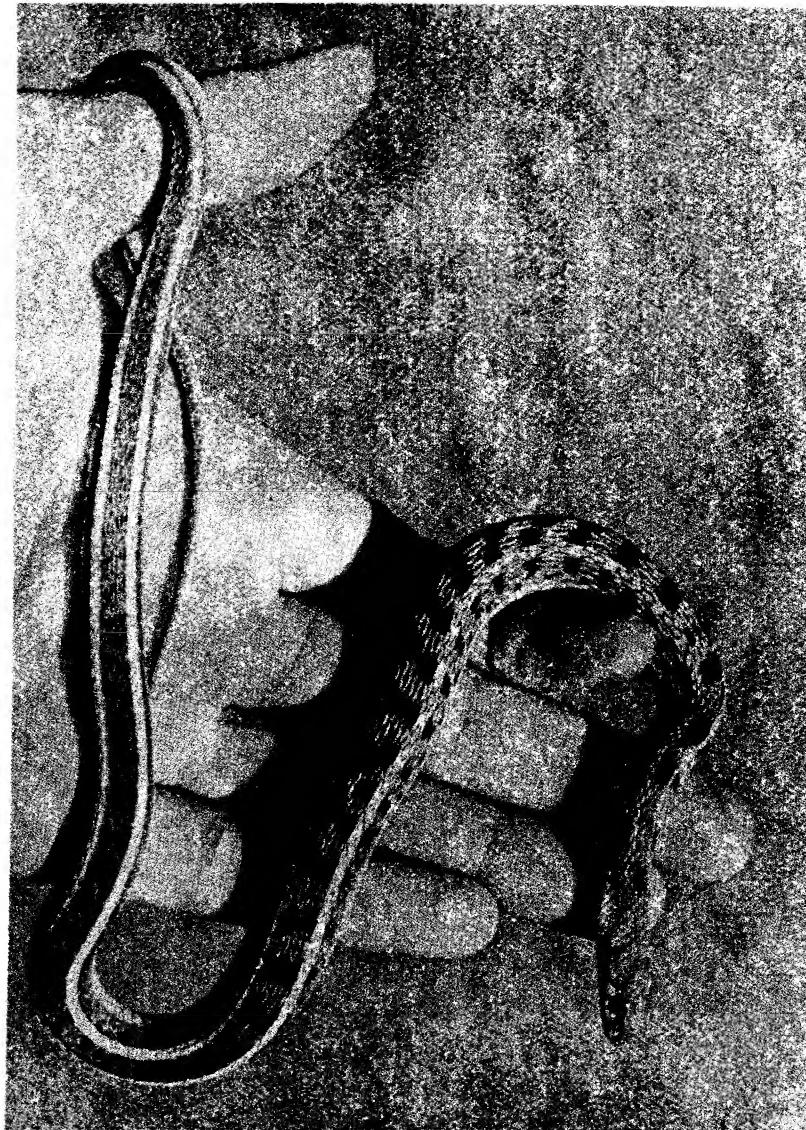
DISTRIBUTION: Throughout India upto 2,000 m in the hills.

HABITAT: Rice fields, pond edges, thick grass and bushes are favoured.

HABITS: Striped Keelbacks are diurnal and spend nights sleeping under rocks, holes or the branches of trees or bushes. During the breeding season, a female may be found attended by six or more smaller males. One of the gentlest snakes, they very rarely bite even when first caught, making them a perfect snake for the amateur herpetologist. When frightened, some spread a small 'hood', revealing the beautiful blue, red or white interscale colour.

YOUNG: On 11 August a female at the Madras Snake Park laid 12 eggs. We have observed egg-laying year round.

FOOD: Frogs are the main diet but Striped Keelbacks will also take toads, small lizards and rodents, which are swallowed alive. The young feed on insects, tadpoles and the young of



Striped Keelback

toads and small-mouthed frogs (*Microhyla*).

STATUS: Very common.

REMARKS: Commonly found in gardens. Striped Keelbacks are often mis-identified as 'baby cobras' and needlessly killed by undiscerning gardeners and house-holders.

HARMLESS

9. Green Keelback

Macropisthodon plumbicolor

DISTINCTIVE FEATURES: Medium-sized; keel-scaled; grass-green; flattens neck into 'hood' with distinctive 'V' mark when disturbed.

AVERAGE LENGTH: 55 cm; *At Birth:* 7.5 cm; *Maximum:* 80 cm.

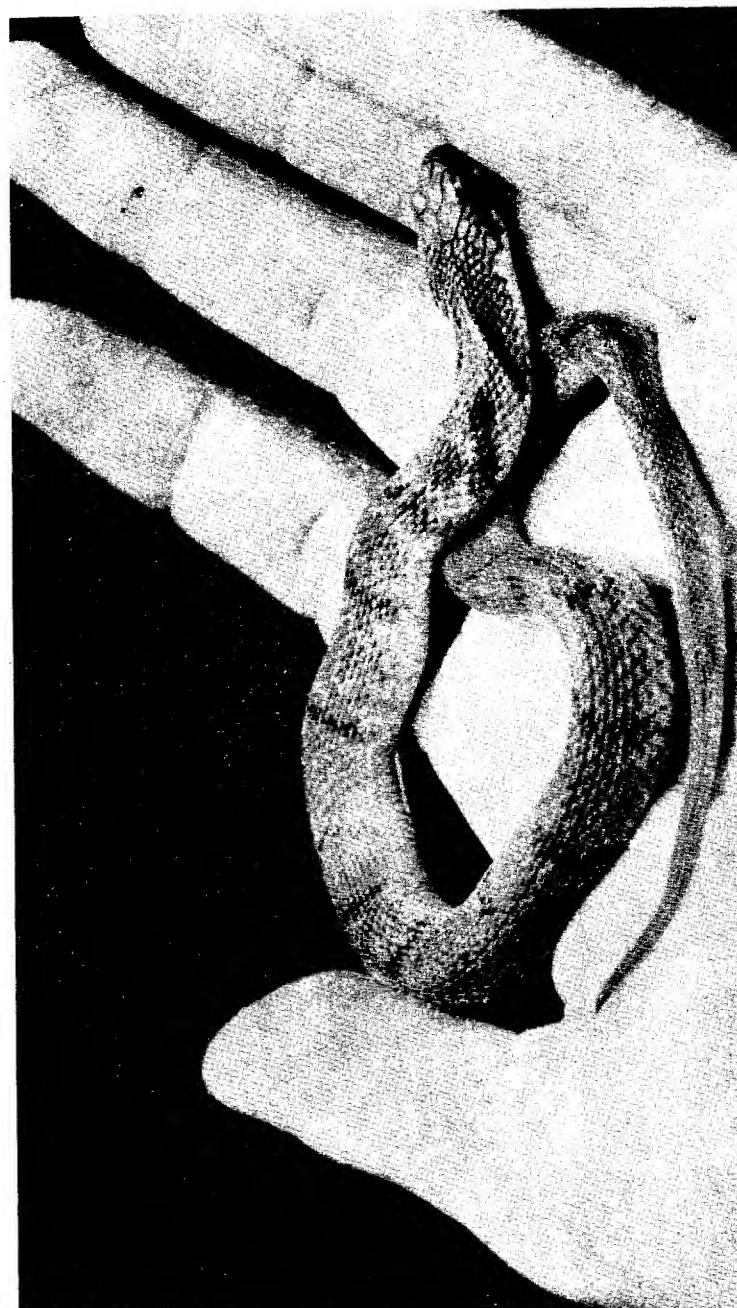
DESCRIPTION: The overall colour of the stocky Green Keelback is bright green with indistinct and irregular black cross lines. The head and neck bear a fairly clear inverted 'V' mark which becomes part of the 'hood' design when the snake is aroused. The skin is slightly glossy and strongly keeled. The head is wide and the round-pupilled eyes large. Underside is greyish-white. The young are brightly marked (see *Young*).

DISTRIBUTION: Forests of India. Up to 1500 m above sea level.

HABITAT: Green Keelbacks are found mainly on hills and plateaus, in dense evergreen as well as open deciduous forests.

HABITS: Very little is known about this snake. When frightened, they will freeze into kinked 'S's as many snakes do. When provoked, they may spread a good sized 'hood' and rear up slightly. As M.A. Smith remarks, 'In disposition, it is singularly gentle and inoffensive.'

YOUNG: The female lays about 12 eggs. For up to 8 months or a year, the young are brightly coloured with black bands and speckled markings on the body. The neck markings are also prominent.



Green Keelback

FOOD: Green Keelbacks prefer toads to all other prey. These are seized with the appropriate long rear teeth in the roof of the mouth.

STATUS: Not a common snake, but widely distributed; its preferred forest habitat is rapidly disappearing.

HARMLESS

10. Checkered Keelback Watersnake

Xenochropis piscator

DISTINCTIVE FEATURES: Medium-sized; keeled, shiny scales; conspicuous black eye-streaks and distinctive checkered pattern.

AVERAGE LENGTH: 60 cm; *At Birth:* 12.5 cm; *Maximum:* 1.75 m (female).

DESCRIPTION: Checkered Keelback Watersnakes vary in colour from black with light markings to bright yellow with the characteristic black and white checkered pattern. The one or two black eye-streaks are distinctive and the head is obtusely pointed and distinct from the neck. The scales are strongly keeled and overall, the heavy-bodied snake is glossy. Underside is usually shiny and pure white. This is the common water snake of India, prolific, adaptable and found almost everywhere, in and near fresh water.

DISTRIBUTION: Throughout India. In the streams of the higher hills in the Ghats and the Himalayas, darker forms are common, but appearances and habits are very similar. Up to 3,000 m in the Himalayas.

HABITAT: Lakes, ponds, wells, rivers, streams and flooded rice-fields.

HABITS: Checkered Keelbacks are active by day and night, and hunt along the edges of ponds and rice-fields, spending much time on land during the night. When excited, it flattens the head, extends the ribs of the neck and rears up; many mistake them for cobras. They bite readily when stepped on or caught,



Checkered Keelback Watersnake

but very quickly become tame if properly handled.

YOUNG: The female generally lays 20-40 eggs in a rat tunnel, termite mound or hole in a well, wall or tank *bund*. She incubates and/or protects her eggs until they hatch 60-70 days later. In Madras, eggs are laid December through February, but in the north, the season seems to be around March.

FOOD: Young watersnakes feed on tadpoles and water insects. As they grow larger, they take fish, frogs and occasionally rodents and birds. They generally swallow their prey alive. The long 'frog teeth' in the back of the upper jaw hold and puncture frogs.

STATUS: The skins of this watersnake are prominent items in the skin trade. Though probably the most common and abundant snake in India, we have seen several local populations wiped out by intensive all-season collection.

HARMLESS

11. Olive Keelback Watersnake

Atretium schistosum

DISTINCTIVE FEATURES: Small to medium-sized; keeled, shiny scales; dorsal half of body olive-green; underside yellow.

AVERAGE LENGTH: 45 cm; *At Birth:* 10 cm; *Maximum:* 1 m.

DESCRIPTION: The Olive Keelback is a thin-headed snake. The overall colour is a rich olive-green, sometimes bordered with a red streak along each side of the body. The underside is yellow or orange. The female is generally larger than the male. Olive Keelbacks resemble *Enhydris*, another common water-snake; however, *Enhydris*, the Smooth Watersnake, prefers rivers and estuarine creeks. It is plentiful in Kerala, Orissa and Bengal.

DISTRIBUTION: Common in peninsular India; absent in the north. Found upto 1,000 m above sea level.



Olive Keelback Watersnake

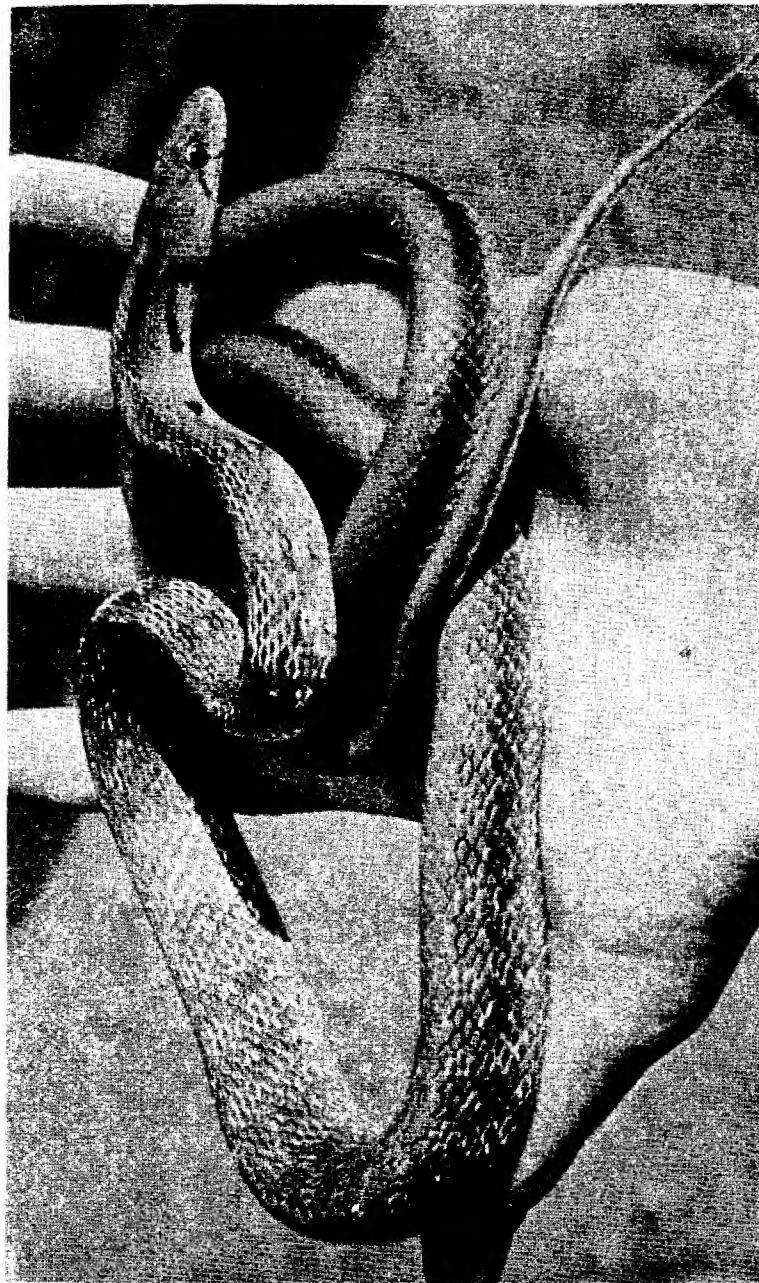
HABITAT: Still waters of tanks and ponds, where it occupies crab and other holes.

HABITS: Seems to be diurnal but is seen moving around at night as well. Olive Keelbacks rarely bite when handled.

YOUNG: 12 to 30 eggs are laid December through March.

FOOD: Tadpoles, fish and frogs are caught with the characteristic side-strike used by most aquatic and marine snakes. The snake swims past the prey object and suddenly snaps the head to the side. We have found that Olive Keelbacks eat mosquito larvae. This habit merits further study especially in view of the danger of DDT and the increasing threat of malaria.

STATUS: Common. Though sometimes called 'water cobra', people are tolerant toward this small, well-camouflaged snake. Consequently, it is relatively common.



Trinket Snake

HARMLESS

12. Trinket Snake

Elaphe helena

DISTINCTIVE FEATURES: Medium-sized, slender; smooth, glossy scales; light forebody and dark tail.

AVERAGE LENGTH: 70 cm; **At Birth:** 25 cm; **Maximum:** 1.5 m.

DESCRIPTION: The Trinket Snake is tan and chocolate-brown with two prominent dark stripes on the latter part of the body and light bands and checks on the forepart. The long head is unmarked, the eyes are prominent and round-pupilled. The two short dark lines on either side of the neck may join medially to form an inverted 'V'. The underside is pearly white. The scales are smooth and glossy. The scales in front of the eye are scattered with pores, which may be sensory. There are 9 species of trinket snakes in India. The typical one is a quiet-natured snake found at times of cooler weather on the plains and in the hills.

DISTRIBUTION: Throughout India. The Green Trinket is found in the Andamans, and the Mandarin Trinket is found upto 4000 m in the Himalayas.

HABITAT: During the hot weather, Trinket Snakes live deep in termite mounds, rock piles and crevices. In the cool season they emerge and are found in leafy trees and bushes.

HABITS: Trinket Snakes are active both night and day. Though generally well-mannered and calm when handled, some will swell their necks, rear back open-mouthed and make quick strikes at an aggressor. Sometimes they will vibrate their tail in defence, which reminds one of the highly specialized rattle snakes of the Americas.

YOUNG: The female lays 6 to 8 long eggs. The young resemble the adults. Breeding seems to be year-round; one at the Madras Snake Park laid 8 eggs on 14 February, which hatched on 11 April; another laid in mid-December, and yet another at the end of August.

FOOD: Like the famous rat snakes of the United States, the adult trinket is mainly a rodent eater, killing its prey by constriction. Occasionally, birds and their eggs are also eaten. The young take insects and small lizards.

STATUS: Trinket Snakes are nowhere very common. They favour farmlands as well as forest, so the rapid increase of cleared agricultural lands seems to have little effect. Though beautiful and often large, they are not plentiful enough to be in demand by the skin trade.

REMARKS: Wrongly considered venomous even by snake-catching groups like the Irulas.

HARMLESS

13. Rat Snake

Ptyas mucosus

DISTINCTIVE FEATURES: Large, streamlined; shiny scales, dorsal rows keeled; thin neck and large eyes.

AVERAGE LENGTH: 2 m; **At Birth:** 32 cm; **Maximum:** 3.5 m (male).

DESCRIPTION: Common, widely distributed snakes usually vary considerably in colour. Rat Snakes may be light-yellow (on the plains) to jet-black (in the hills) and many shades of green, olive, or brown in between. The body is uniformly coloured but the skin bears interscale markings which show up when the snake puffs itself up in defence. The underside often has cross bars that are quite prominent in specimens from northern India. The lower 'lip' often has black horizontal lines. When seen only briefly, Rat Snakes resemble cobras but they are actually longer and thinner with pointed rather than round heads and prominent eyes. In comparing them, note eyes, head and neck of the two species.

DISTRIBUTION: Throughout India, including the Andamans and Nicobars, from sea level to 4000 m.

HABITAT: This versatile snake can adapt to almost any environment. Rat holes and termite mounds are preferred dwellings and high grass, rice-fields and storage places favourite hunting grounds.

HABITS: Rat Snakes are prodigious rat eaters and since rats are plentiful where humans are, we naturally see more of this snake than any other. It is diurnal and like all animals that live close to humans, seems to learn our activity cycles and avoids contact in its forays. When threatened, it puffs its throat, hisses, and will strike with force. The harmless bite can be somewhat painful. Like the King Cobra, which it resembles, a severely disturbed Rat Snake may emit a deep, throaty growl.

YOUNG: The female lays 8 to 16 eggs mainly between March and



Rat Snake

July, but also in the winter months. These hatch about 60 days after they are laid.

Food: Though they mainly eat rodents, Rat Snakes also feed on frogs, lizards, birds and even small snakes. Young Rat Snakes are mainly frog eaters but start hunting mice and rats during their first year of life. Prey is swallowed live or killed by pressure of the jaws and body.

Status: Rat Snakes and cobras have been the basis of a large and long uncontrolled skin industry. Entire populations have been wiped out in some localities where they were formerly abundant, resulting in an explosive increase in the rodent population. Many tribal groups subsist on this industry; but seasonal controls to allow breeding and studies on the level of cropping a sustained yield without risk of extinction may afford them a livelihood without severe effect on agriculture. (At the time of writing, the export of snake skins has been completely stopped by the Ministry of Commerce, but internal trade continues without regard to breeding seasons.)

HARMLESS

14. Banded Racer

Argyrogena fasciolatus

DISTINCTIVE FEATURES: Small to medium-sized, slender; smooth scales; young brightly banded, adults uniform, without pattern.

AVERAGE LENGTH: 75 cm; *At Birth:* 15 cm; *Maximum:* 1.25 m.

DESCRIPTION: The Banded Racer is light or dark brown; younger ones have white cross bands, regularly spaced. Young snakes also have brilliant white head markings. The head is little wider than the neck, the nose slightly pointed. The scales are smooth but not glossy. The underside is white or yellowish.

DISTRIBUTION: Plains throughout most of India.

HABITAT: This alert, fast snake favours high grass or bushes. They



occupy rodent burrows, rock piles and heavy brush.

HABITS: Energetic and swift by day. When captured, it may bite and display a narrow 'hood' by flattening its ribs in the neck region. After some time, it calms down and becomes a good pet.

YOUNG: In South India, the female lays 2 to 6 eggs during October.

FOOD: The young eat frogs and insects. Adults take field mice and metad rats (*Rattus meltada*). Rodents are followed into their burrows and immobilized by constriction or pressing with the body.

STATUS: Clearing of vegetation and severe over-grazing are reducing the habitat in many areas.

HARMLESS

15. Royal Snake

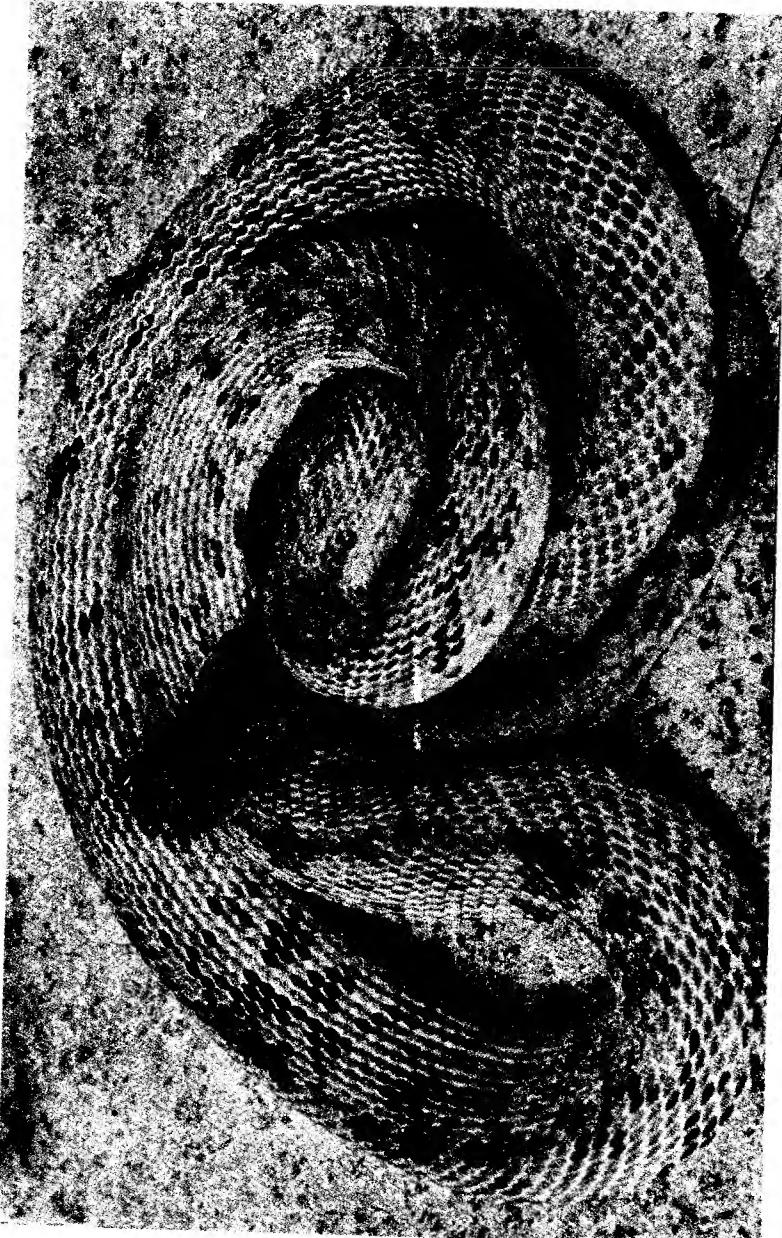
Spalerosophis diadema

DISTINCTIVE FEATURES: Medium-sized to large; keeled scales; young with uniform spots; adults with black heads and very irregular black markings.

AVERAGE LENGTH: 1.5 m; **At Birth:** App. 25 cm; **Maximum:** 2 m.

DESCRIPTION: The overall colour of the Royal Snake is yellowish-brown or orange, with irregular black markings down the back, and jet-black head and neck. The glossy underside is rose-pink. The dorsal scales are strongly keeled and the body has a beautiful iridescent sheen. This is the only Indian snake we know whose pattern changes constantly as it grows. The young are very different with light, evenly blotched patterns and no black markings. Royal Snakes, being large, are conspicuous and are often seen with snake charmers in the north.

DISTRIBUTION: Confined to the dry areas of Rajasthan, Punjab, Uttar Pradesh, Kashmir and Himachal Pradesh up to 2,000 m above sea level (refer to any political boundary map).



Royal Snake

HABITAT: Lives in rat holes, rocky areas and crevices. An excellent and fast climber that can be found in trees and bushes in arid and in semi-arid areas.

HABITS: Royal Snakes seem to be mainly active by day. They are similar in form and behaviour to trinket snakes but grow larger and are generally faster in activity and reaction. When disturbed they coil and hiss surprisingly loud, yet rarely bite.

YOUNG: These are egg layers, but the number of eggs and the months of laying are not known.

FOOD: Mainly rodent eaters, but they prey on small birds and lizards as well.

STATUS: Royal Snakes are common throughout their range and are important rodent predators. They are regarded as venomous by many and killed on sight. Despite the obvious differences people will even call them 'nag' (cobra).

HARMLESS

16. Bronzeback Tree Snake

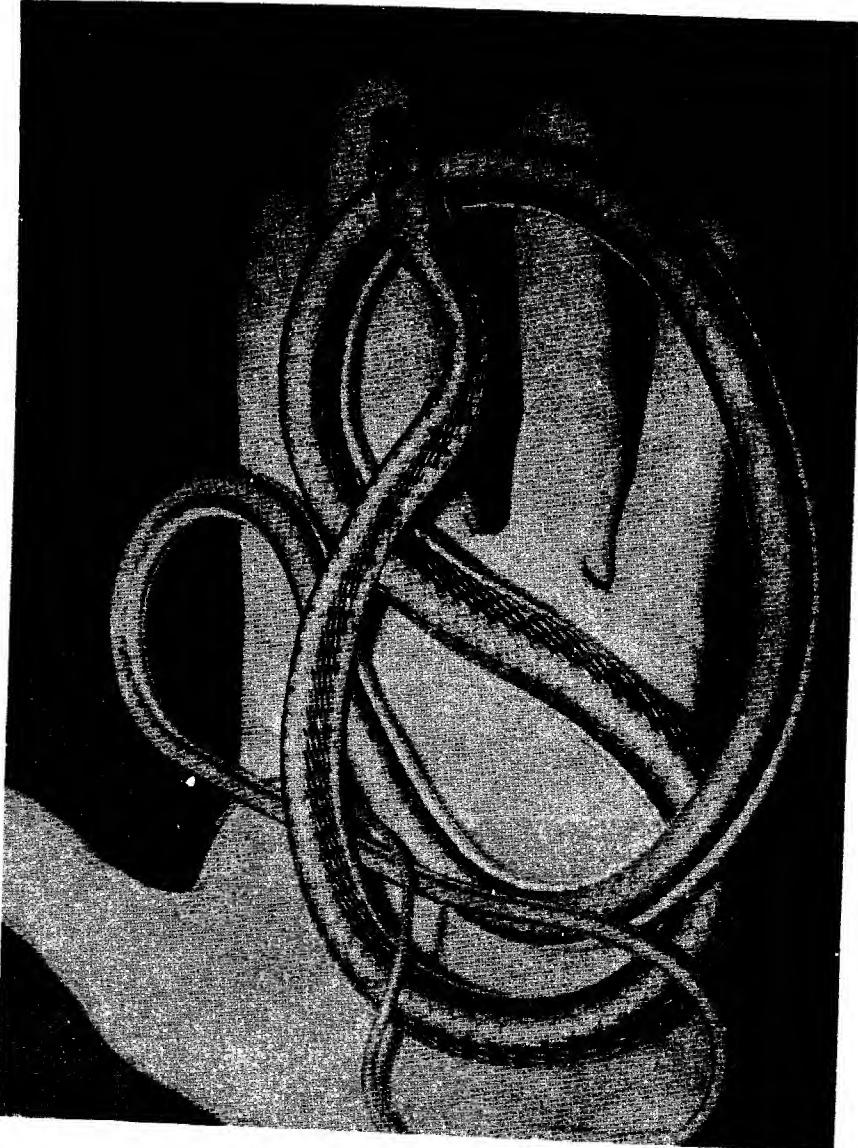
Dendrelaphis tristis

DISTINCTIVE FEATURES: Medium-sized, very slender; smooth scales; wide brown or bronze dorsal stripe from head to tail.

AVERAGE LENGTH: 1 m; *At Birth:* 15 cm; *Maximum:* 1.5 m.

DESCRIPTION: Bronzeback Tree Snakes are long and slender with flat heads and large eyes. The sides are dark brown or black with a wide light bronze stripe down the centre of the back. The underside is whitish, grey or light green. The young are very similar to the adults but have a faint banded pattern which they lose in the first year. The outer edges of the belly scales are notched, forming a fold on either side of the body which serves the snake when it is climbing. There are 8 species of bronzebacks in India, most of which live in hill forests.

DISTRIBUTION: Throughout India, including the Andaman and



Bronzeback Tree Snake

Nicobar Islands. Found up to 2000 m above sea level in the Himalayas.

HABITAT: Arboreal, occupying low bushes, thorn trees such as *Acacia*, toddy palms and palmyra.

HABITS: Bronzebacks are alert snakes which engage neck and forebody in a strange wavering 'dance' while moving about, or when disturbed. They are diurnal and very active even during the hottest part of a summer day. When excited, bronzebacks inflate the neck and body showing white or steely blue interscale colour. They strike and bite with quick jabs but become calm with proper handling. Unlike other snakes, bronzebacks have no fear of falling and regularly jump among branches and to the ground from heights of 10-20 m. They are usually found in the open and rarely hide.

YOUNG: The female Bronzeback Tree Snake lays about 6 long thin eggs in a tree-hole or old bird-nest. One in Madras laid 7 eggs on 6 April which hatched on 30 May.

FOOD: Mainly frogs and lizards. It is not uncommon for bronzebacks to hunt tree frogs and geckos in thatched roofs; consequently, they sometimes get into trouble with human occupants.

STATUS: Common.

REMARKS: Several misleading stories are told about this harmless snake. In Tamil Nadu they are said to bite, then climb a tall tree to observe the victim's funeral pyre!

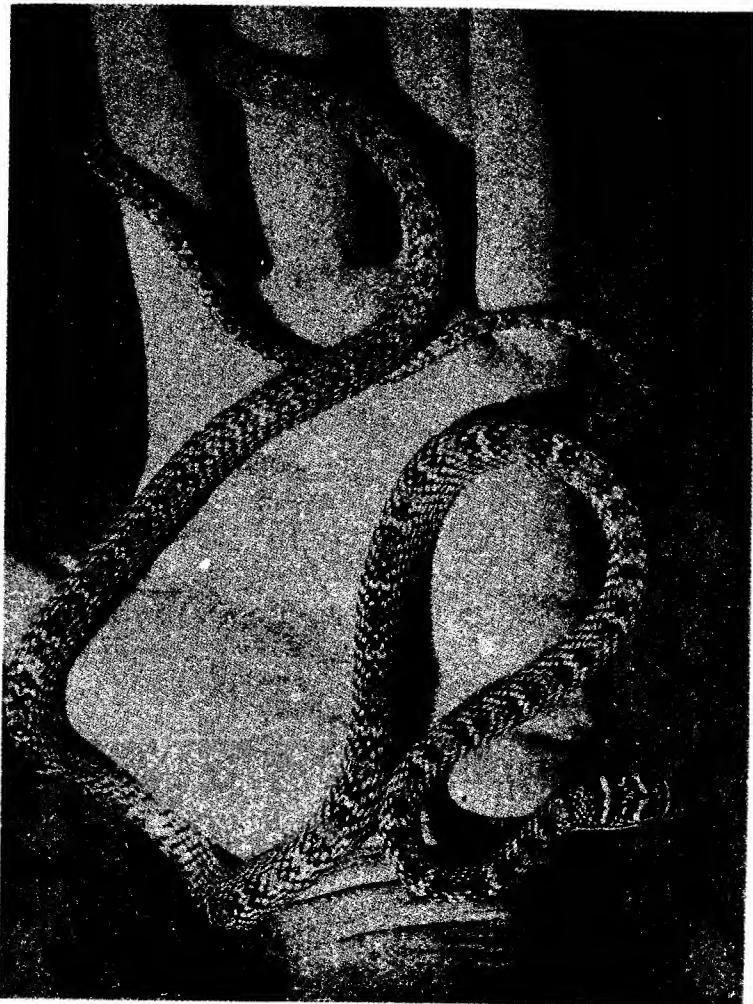
HARMLESS

17. Flying Snake

Chrysopela ornata

DISTINCTIVE FEATURES: Small to medium-sized, slender; smooth scales; very bright pattern of black, yellow and red.

AVERAGE LENGTH: 1 m; **At Birth:** 20 cm; **Maximum:** 1.75 m.



Flying Snake

DESCRIPTION: The thin, fast and colourful Flying Snake gives one the immediate impression of vibrant energy. The back is black, beautifully marked with yellow or white cross bands and speckles and red rosettes. The underside is greenish and has lateral folds on the belly scales used in climbing as are those of the bronzebacks. The head is brightly barred. The pattern and colouration of head and trunk vary geographically. The scales are smooth and slightly glossy.

DISTRIBUTION: Forested hills of the southwest, and the forests of northeast India north of Bihar and Orissa, up to 2000 m above sea level. Another species, the Paradise Flying Snake (*C. paradisi*) is common on Narcondam in the Andamans.

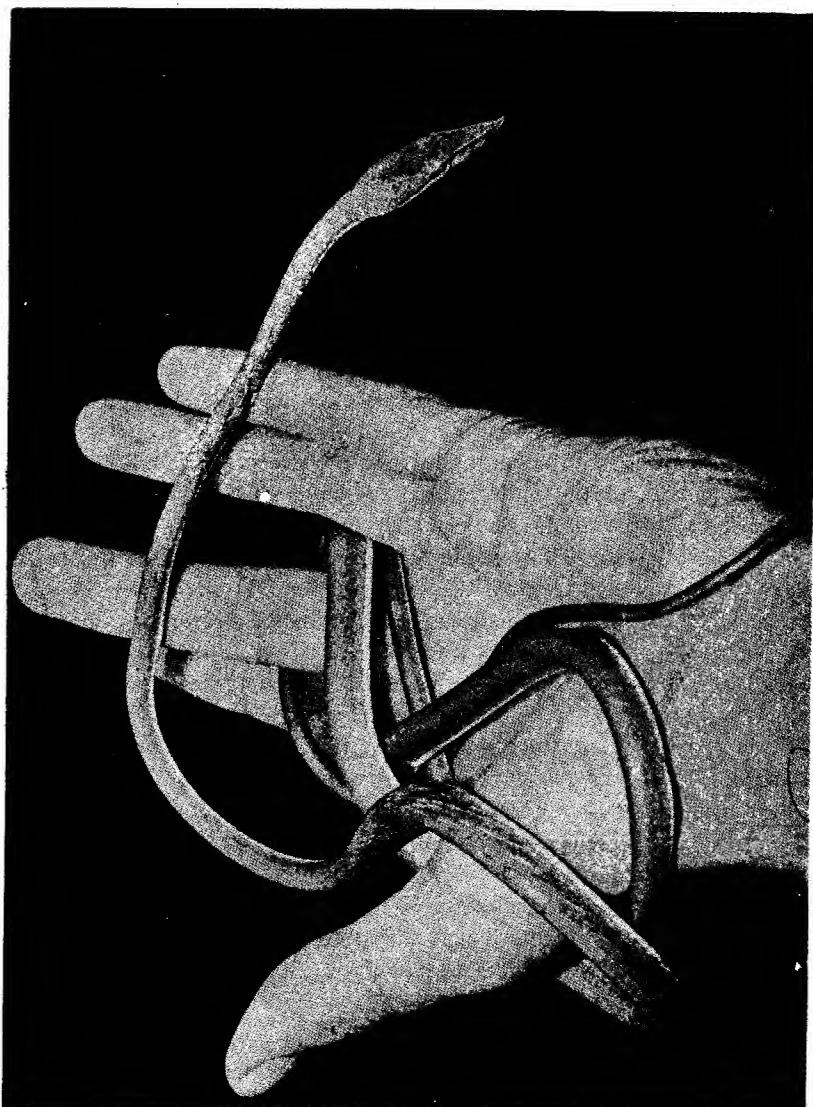
HABITAT: Seems to prefer large trees and thick forest. (In Sri Lanka and Thailand, however, it is seen around houses and gardens.)

HABITS: Active by day. Like the bronzebacks, Flying Snakes escape predation by jumping, even from very high branches. Scientists at the University of Michigan have analyzed films of the flight of this snake. They extend their ribs and pull in the underside. This flattening allows the 'flying' snake to be a bit of a glider, keeping it from falling straight down. It is wonderful to watch it leaping from branch to branch between trees.

YOUNG: The female lays 6 to 12 eggs, according to M.A. Smith. In Bengal they are laid in February-March.

FOOD: Flying Snakes are similar in habits to the bronzebacks and also feed on frogs, lizards (including geckos), small birds and probably their eggs. It evidently swallows prey alive, although it has rear 'fangs' and a slightly toxic saliva perhaps effective in immobilizing prey.

STATUS: We have collected only one specimen in the Western Ghats (Kalakkadu, Tamil Nadu) and it seems to be a rare snake there. In Bengal, it appears on the live biological supply market with fair regularity. It is unfortunately very popular with snake fanciers in Europe and America and has been exported in large numbers in the past. Snake-charmers tout it as a 'highly venomous' snake. Apparently the more colourful a snake is, the deadlier it is: only the bravest can handle a colourful species!



Vine Snake

HARMLESS

18. Vine Snake

Ahaetulla nasutus

DISTINCTIVE FEATURES: Medium-sized to large, slender; smooth, dull scales; very pointed head and bright green colouration.

AVERAGE LENGTH: 1 m; *At Birth:* 20 cm; *Maximum:* 2 m (female).

DESCRIPTION: Vine Snakes are long and thin with very pointed heads. The body is a uniform parrot-green, often with a thin white or yellow line separating the back scales from the belly scales. (A South Indian hill race which is seen at about 2300 m is pinkish-red.) The underside is light green or yellow. When excited, the inflated neck and body reveal the black and white inter-scale colour, giving it a banded appearance. The scales are smooth but not shiny. The horizontally elliptical eye is unique among those of Indian snakes. Though common, Vine Snakes are rarely seen because of their excellent camouflage.

DISTRIBUTION: Throughout India, except in the northwest and much of the Gangetic basin, upto 2500 m above sea level.

HABITAT: Ranges from low bushes and trees on the plains to large rain forest trees in the hills.

HABITS: Vine Snakes depend on their shape and colour to escape detection. They can move at a fair speed. When provoked they open the mouth very wide and swell the body menacingly. Vine Snakes are rear-fanged and generally hold their prey until the mildly toxic venom has killed it. During the breeding season, they often bunch together in a cluster, and can be seen hanging in groups in branches.

YOUNG: About 8 young are born alive in August-November, in the Madras area. The hatchlings are tiny replicas of the parents with slightly turned-up noses.

FOOD: Mainly lizards, frogs, mice and small birds. In Sri Lanka, Vine Snakes have been observed catching and eating fish, and we have come upon one swallowing a shieldtail snake.

STATUS: Common. Greatly feared, this harmless snake is almost always killed when seen. In many areas, it is foolishly believed that Vine Snakes will dart at a person's eyes and peck them out.

19. Common Cat Snake

HARMLESS

Boiga trigonata

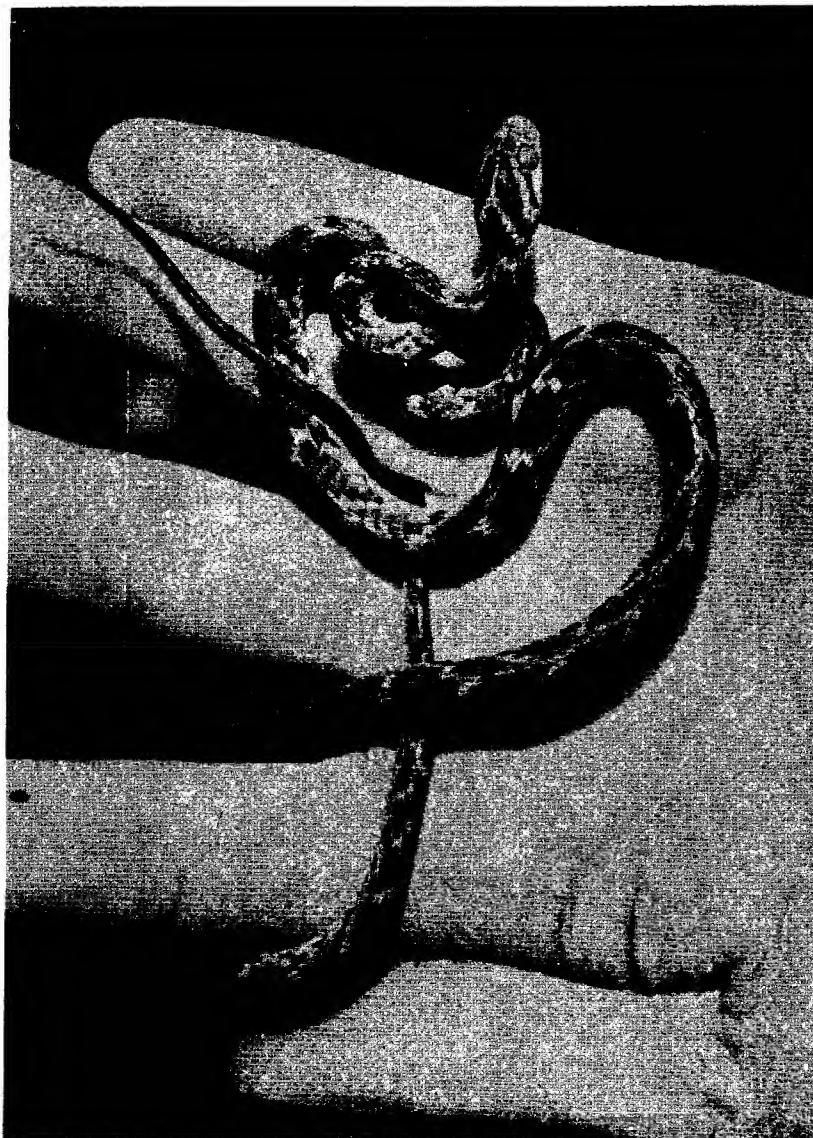
DISTINCTIVE FEATURES: Small to medium-sized; very slender; smooth scales; very thin neck; protruding eyes; flat head; distinct pattern.

AVERAGE LENGTH: 65 cm; *At Birth:* 25 cm; *Maximum:* 1.25 m (female).

DESCRIPTION: The Common Cat Snake is thin with a long body and a tail that tapers to a fine point. The colour is light brown or tan with a darker pattern of zigzag markings. The top of the head has a clear 'Y' mark. The underside is whitish or tan, sometimes with tiny spots on each belly scale. The scales are smooth but not glossy. Common Cat Snakes are often mistaken for saw-scaled vipers; in fact, the snake-hunting Mahrs of Maharashtra call them the 'long saw-scaled vipers'. However, cat snakes are longer and thinner than the stubby vipers. There are 11 species of cat snakes in India; the others are mostly hill snakes, one of which, Forsten's Cat Snake, grows to 2 metres. Another, the Andaman Cat Snake, is found only in the Andamans and Nicobars.

DISTRIBUTION: Throughout India, mostly on the plains. The Himalayan Cat Snake, however, is found up to 3000 m above sea level.

HABITAT: Common Cat Snakes are called 'palm leaf snakes' in Tamil, as they are often found coiled up in the leaves of the palmyra during the day. They also spend daylight hours in a cool place, among bushes, in thatched roofs or under the bark of trees.



Common Cat Snake

HABITS: The protruding cat-like eyes and long feathery tongue indicate that this snake is nocturnal. They are rear-fanged and have a mild venom for paralyzing their small prey. They are inoffensive and when disturbed will coil tightly and put on a defensive show, rearing back and vibrating the tail. If prodded, they sometimes turn over and play dead.

YOUNG: A Common Cat Snake at the Madras Snake Park laid 7 eggs on 20 October.

FOOD: Mainly geckos and other lizards; but also mice and small birds.

STATUS: In many areas in South India, this can be called a common snake; but like other inconspicuous or nocturnal snakes, it is rarely seen.

HARMLESS

20. Dog-Faced Watersnake

Cerberus rhynchops

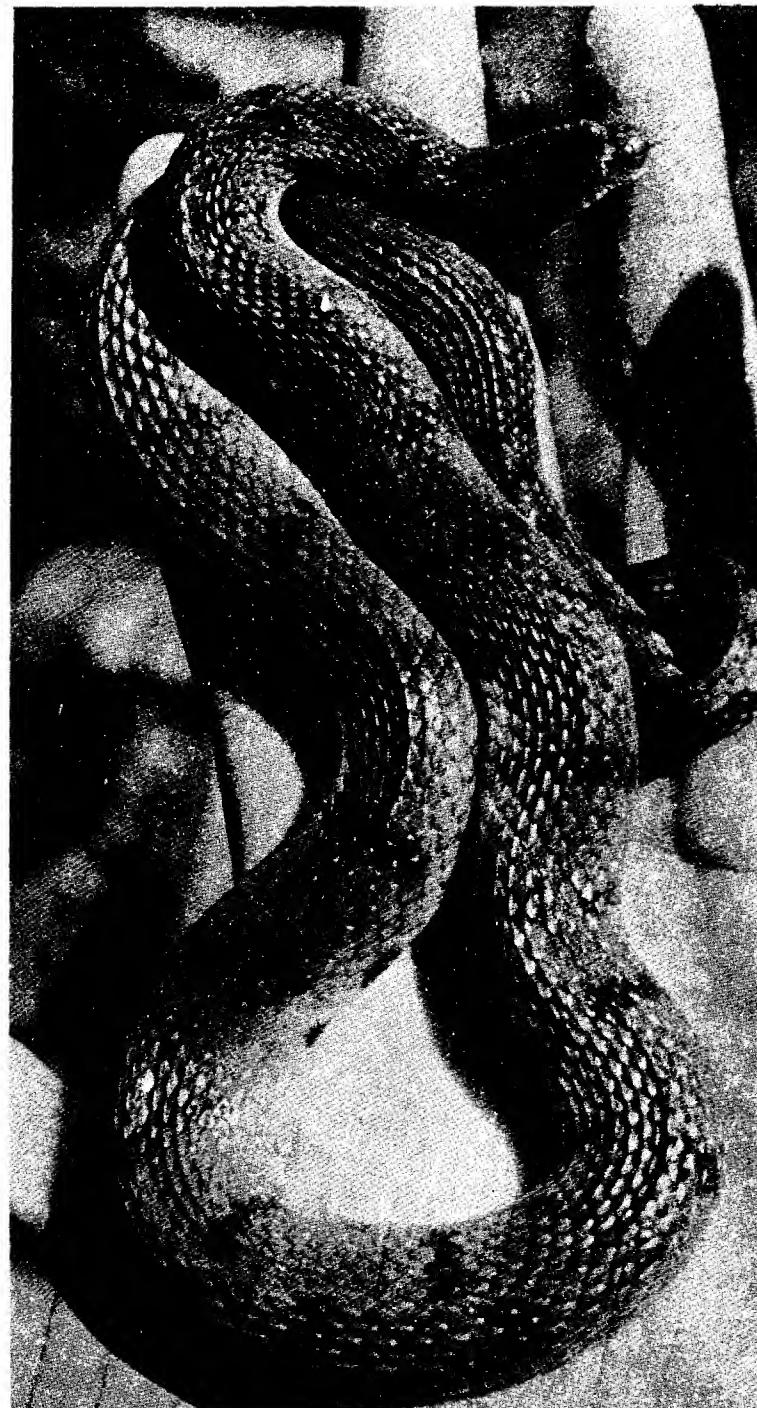
DISTINCTIVE FEATURES: Medium-sized, thick-bodied; scales keeled, dull; head wider than neck; small eyes; back pattern obscure; checkered belly distinctive.

AVERAGE LENGTH: 60 cm; *At Birth:* 15 cm; *Maximum:* 1.25 m (female).

DESCRIPTION: The Dog-faced Watersnake is heavy-bodied, with eyes and nostrils set high on the head. The overall colour is slate-grey with sometimes indistinct irregular black cross bars. Black lines run back from the eyes; the belly has distinctive black and white checks. The scales are heavily keeled, and dull. There are 6 other species of rear-fanged swamp snakes in India.

DISTRIBUTION: Coastal India including the Andamans and Nicobars.

HABITAT: Muddy and rocky areas in estuaries such as mangrove swamps, salt pans and creeks. Though brackish water is



Dog-faced Watersnake

preferred, we have found Dog-faced Watersnakes several miles from the coast in fish traps set in rice-fields.

HABITS: Dog-faced Watersnakes seem to be mainly nocturnal but have been observed mating and feeding during the day also. They live in crab holes and under rocks near the shore line, where they can be seen with just the head showing. The long, sensitive tongue is extended and remains out as the snake swims along the bottom. It is an excellent, agile swimmer and will, when frightened, resort to a leaping, side-winding escape on land.

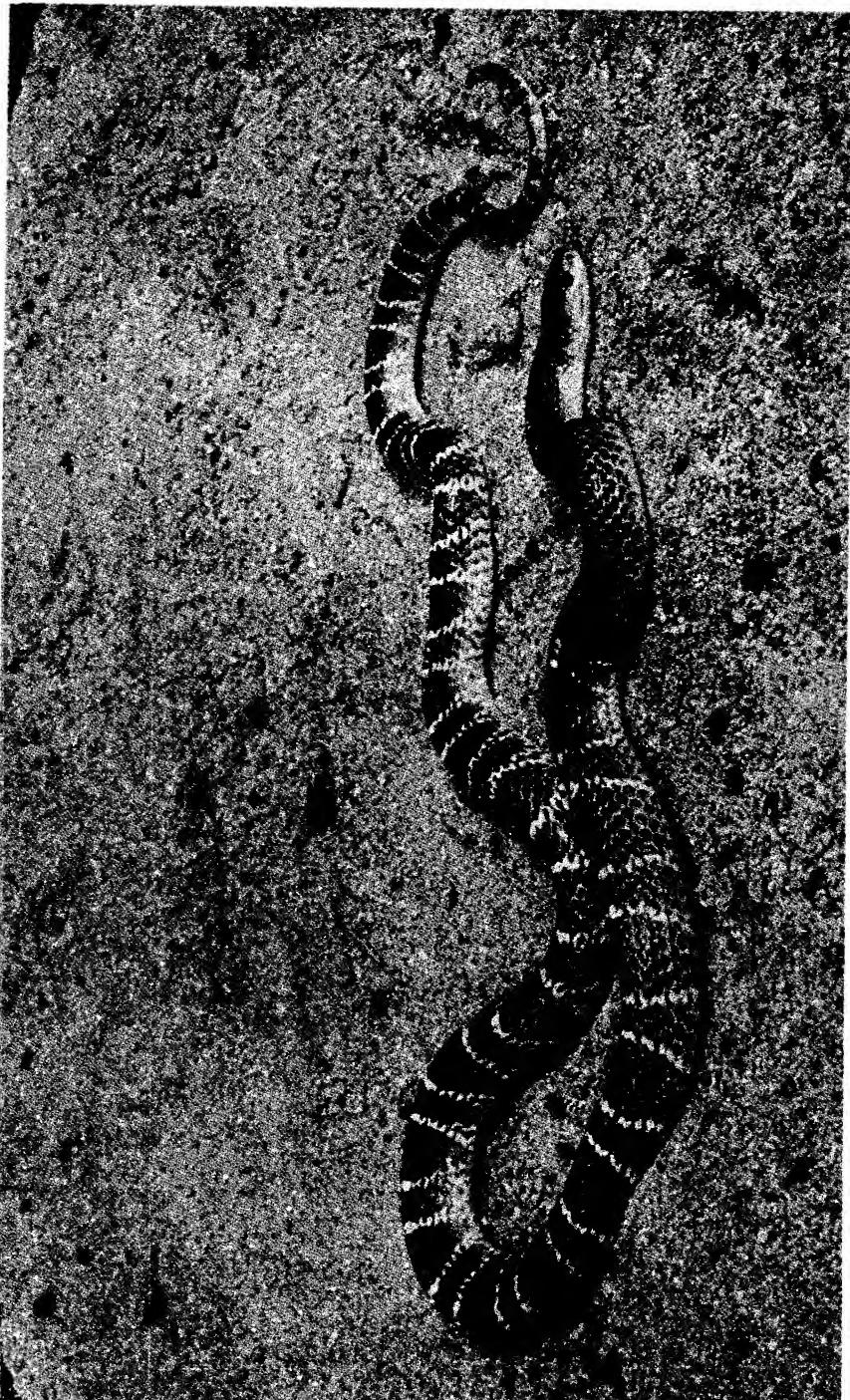
YOUNG: 6 to 30 living young are born between February and May.

They stay grouped together for a week or more, often with the mother close by.

FOOD: Mainly several species of fishes, including spiny ones like *Tilapia* and cat fish (*Clarias*). It also eats frogs.

STATUS: Unexploited but affected by loss of coastal habitat and pollution of brackish waterways. Oddly enough, M.A. Smith considered it to be a rare snake; actually, it is most abundant in India.

The Venomous Snakes



Common Krait

VENOMOUS

21. Common Krait

Bungarus caeruleus

DISTINCTIVE FEATURES: Medium-sized; smooth, glossy scales; head slightly wider than neck; jet-black, usually with distinct white cross lines.

AVERAGE LENGTH: 1 m; *At Birth:* 25 cm; *Maximum:* 1.75 m (male).

DESCRIPTION: Common Kraits are smooth, glossy bluish-black snakes with the rounded head slightly distinct from the neck. The body colour varies from a dark steely blue-black in a specimen which has freshly shed its skin to a pale faded bluish grey in one just about to shed. There are normally about 40 thin white cross bands. The young and some adults may have white spots along the first third of the backbone in place of the cross lines. This variation as well as uniform black variants appear in certain geographic races. The underside is white. Common Kraits are often confused with wolf snakes (*Lycodon* sp.) which are much smaller, with flat, somewhat pointed heads. The Common Krait is the best known of the 6 krait species found in India and one of the Big Four dangerous snakes. Besides the Common and Banded Kraits, the other kraits are rare and confined to the eastern Himalayas and Assam.

DISTRIBUTION: Most of India including the Andamans and Nicobars; sea level up to 1700 m. Uncommon in Bengal, Assam and Orissa, where the Banded Krait is found.

HABITAT: Sandy soil, termite mounds, burrows of small rodents and piles of brick and rubble are the best places to find Common Kraits, which are mainly snakes of the plains. Though very common in some parts of the country (such as coastal Tamil Nadu), one rarely sees them.

HABITS: During the daytime, kraits hide: holes of field mice (*Mus hooduga*) and metad rats (*Rattus meltada*) are favourite dwellings. Kraits are nocturnal and are not seen by day. Male kraits

seem to be territory and/or sex conscious at most times of the year. When a male snake is introduced to a cage of captive specimens, a jerking 'dance' often ensues, sometimes ending in a serious fit of biting. Kraits are short-fanged snakes with a bulldog grip, and very fast and active at night.

YOUNG: In Madras, the female lays 8 to 12 eggs March to May which hatch in May-July. In the north, eggs appear a month later. The female stays with her eggs during incubation as do other snakes such as the cobra.

FOOD: Mainly snakes, lizards and rodents. Kraits are true cannibals and it is not unusual to find a few smaller kraits missing from a captive group. Striped keelbacks and olive keelbacks seem to be favourite food items.

STATUS: Common Kraits are common and very abundant in some areas. They live and thrive near human settlements and remain undisturbed because of their secretive nocturnal habits.

VENOM: Krait venom is extremely toxic and induces nerve paralysis. As there are no local symptoms, a patient should be carefully observed for signs of paralysis and treated urgently with anti-venom.

VENOMOUS

22. Banded Krait

Bungarus fasciatus

DISTINCTIVE FEATURES: Medium-sized to large; smooth, shiny scales; wide bright yellow and black bands on back.

AVERAGE LENGTH: 1.5 m; *At Birth:* 25-30 cm; *Maximum:* 2.25 m.

DESCRIPTION: The Banded Krait is a large, conspicuous yellow and black banded snake with a prominent backbone, blunt tail and rounded head slightly distinct from the body. The bands are faded on the underside.

DISTRIBUTION: Assam, Bengal, Bihar, Orissa and reported in



Banded Krait

parts of Madhya Pradesh, Andhra Pradesh and Uttar Pradesh. Found upto 1500 m above sea level.

HABITAT: Banded Kraits inhabit termite mounds and rodent holes close to water, and often live near villages because of their supply of rodents and water. They prefer the open plains country.

HABITS: Like all kraits, this secretive snake only ventures out at night. Banded Kraits are timid and mild tempered. Snake dealers handle them without much caution but mention that they are active at night. As with most nocturnal Indian snakes, little is known of this beautiful krait's habits.

YOUNG: A female Banded Krait from Bengal laid 12 eggs on 3 April at the Madras Snake Park. 6 eggs hatched 61 days later.

FOOD: Banded Kraits have similar feeding habits to the Common Krait. They also eat Common Kraits. In captivity, they take snakes (watersnakes) and young rats. The prey normally dies 10-20 minutes after being seized by the krait, which in addition to envenomating, seems to mechanically work its jaws to suffocate prey.

STATUS: Fairly common but rarely seen.

VENOM: The venom has been rated very toxic, but the Banded Krait rarely bites and no deaths have been noted in India from its bite. There is no anti-venom produced against this venom in India; the nearest source is the Queen Saovabha Institute, Bangkok.

VENOMOUS

23. Slender Coral Snake

Callophis melanurus

DISTINCTIVE FEATURES: Small, slender; smooth, shiny scales; blunt, black head; tail black, scarlet and blue.

AVERAGE LENGTH: 25-35 cm; **Diameter:** 5 mm.



Slender Coral Snake

DESCRIPTION: The Slender Coral Snake is light brown and faintly speckled. The head and neck are black with two conspicuous yellow spots on the top of the head. There is a ragged black ring at the tail-base and at the tail-tip. The underside is uniform pinkish-red (coral), bright scarlet at vent, and the underside of the tail is bluish. The head is blunt and has the same width as the neck; the scales are smooth and slightly glossy. Slender Coral Snakes are one of the 5 Indian coral snakes. The other 4 are hill forest species of the Western Ghats and eastern Himalayas.

DISTRIBUTION: Reported from most parts of India on the plains, except central and northwestern India. MacClelland's Coral Snake is found up to 4000 m in the Himalayas.

HABITAT: We have found Slender Coral Snakes in the coastal scrub jungle near Madras, under leaves, brick and rubble piles and sandy patches.

HABITS: Mainly nocturnal, occasionally active in early morning hours in the cooler months. Slender Coral Snakes are good burrowers in sandy soil and will lie motionless with just the head visible. Captive specimens spend most of the time under the sand. When excited, coral snakes will curl their tail up and wave it, exhibiting the startling colours of the underside, detracting attention from the head.

YOUNG: Nothing is known about reproduction except that all Indian coral snakes are egg-layers. North Indian species have been found containing 6 to 14 eggs in July-August (*C. macclellandi*).

FOOD: Captive specimens at the Madras Snake Park feed on worm snakes.

STATUS: Described in literature as rare snakes, coral snakes are forest species and, as such, are doubtlessly becoming rarer as the forested areas of our country shrink.

VENOM: Nothing is known about the venom of these little relatives of the cobra but the Striped Coral Snake becomes more than 1 metre long and could be dangerous to man.

VENOMOUS

24. Indian (Spectacled) Cobra

Naja naja naja

DISTINCTIVE FEATURES: Medium-sized to large; smooth, shiny scales; wide head and neck; wide black band on underside of neck; distinctive hood marking on top of neck.

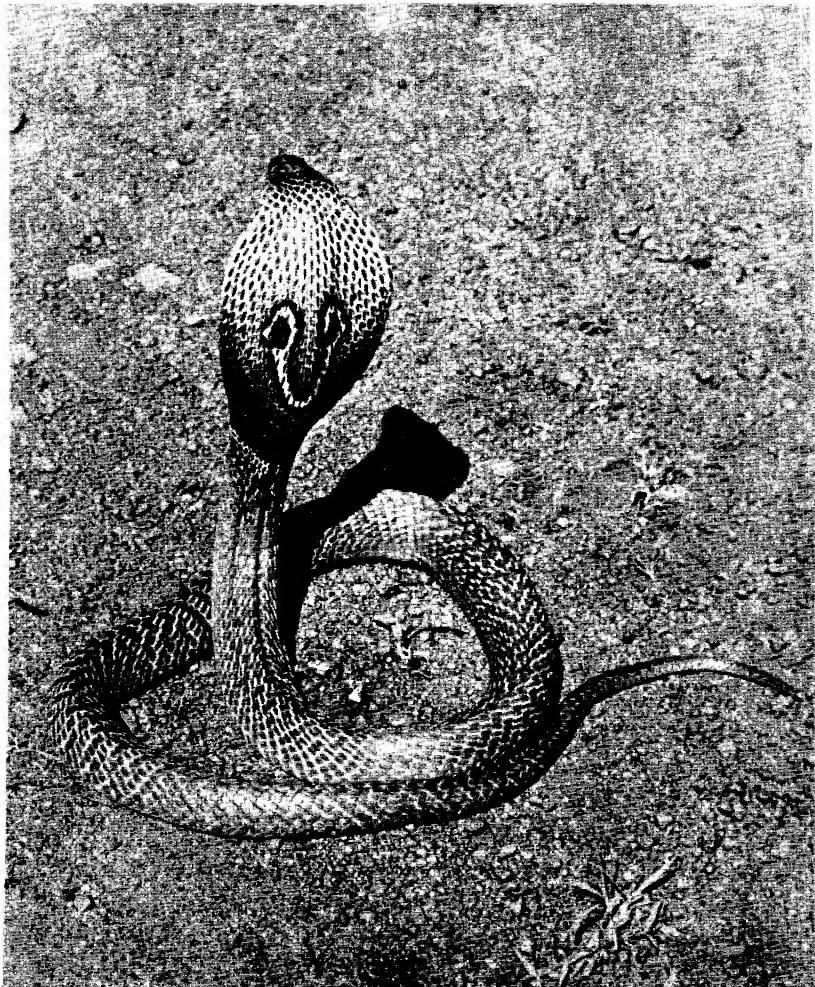
AVERAGE LENGTH: 1 m; **At Birth:** 25 cm; **Maximum:** 2 m (male).

DESCRIPTION: The Spectacled Cobra is a smooth-scaled snake with black eyes, wide neck and head and medium body. Colouring varies from black or dark brown to yellowish white. The underside is usually white or yellowish with a wide dark neck-band. The body is generally covered with a speckled white or yellow pattern, sometimes forming ragged bands. The famous hood marking of the classic design, shows a connected pair of rings. Occasionally, it may not even resemble spectacles, or may be altogether absent. The cobras of northwest India are blackish and have a barely distinguishable hood marking. Cobras are often confused with the Indian rat snakes, which have a much thinner neck and head, and become 3 metres long, a metre more than do the biggest Indian cobras.

The Spectacled Cobra is the most widely distributed of the generally accepted 3 sub-species of cobras in India and is one of the Big Four dangerous snakes. 6 species of cobras occur in Asia, and 9 in Africa. The jet black cobra of northwest India and Pakistan is another sub-species or geographic race. Except for its colour and absence of hood marking, it is very similar to the Spectacled Cobra.

DISTRIBUTION: Throughout India, sea level upto 4000 m (in the Himalayas).

HABITAT: Cobras are common in rice-growing areas, which have plenty of rats for food and holes to live in. However, they seem to be quite adaptable and can be found even in very dry parts of the country. Granaries, termite mounds, earth dams and rock



Indian (Spectacled) Cobra

piles are favourite haunts. Wherever rats multiply, so do cobras.

HABITS: Cobras usually live in rat holes, often near villages, and lead shy existences, out of man's sight. Their warning mechanism consists of spreading the neck ribs, startling the intruder with the bright 'eyes' on the hood. When more excited, they hiss by a sharp expulsion of air from the glottis. Some of the African species of cobras can 'spit' or propel their venom through the air for about 2 metres. Cobras in northeastern India spray their venom for a shorter distance. Evening hours are preferred for moving about and hunting. Like most snakes, cobras become very active in the rains.

YOUNG: Between May and July (depending on the part of the country), the female lays 12-30 eggs, usually in a rat hole or termite mound. She stays with them for the 60 odd days till they hatch, feeding rarely if at all. The young, which are perfect replicas of the parents, usually disperse one or two weeks thereafter. Sometimes more than a single clutch is laid in one hole. Cobras, as well as many other snakes, may breed more than a year.

FOOD: Young snakes feed on insects, lizards, frogs, toads and small snakes. As they grow larger they take rodents, toads, frogs and birds in that order of preference. We have watched cobras swallowing monitor lizards as well. They normally maintain their grip until the prey is immobile.

STATUS: Cobras are hunted and killed for their skins throughout most of their range. Since 1973 the export of cobra skins has been controlled by the Government of India; however, the market continues to flourish and some tanneries deal in thousands of skins per day. As cobras favour farm lands, they probably benefit by the conversion of forests to agricultural lands.

VENOM: The venom affects the nervous system leading to respiratory paralysis and cardiac failure. Usually less than fatal amounts are injected. However, all cobra bites should be treated immediately. Extensive research is being carried out on cobra venoms. At the Tata Memorial Cancer Institute in Bombay it has been found that fractions of cobra venom destroy certain cancer cells in mice. Effective pain killers are made from cobra venom, such as 'Cobroxin' and 'Nyloxin' (Hynson, Wescott and Dunning, USA).



Indian (Monocled) Cobra

VENOMOUS

25. The Indian (Monocled) Cobra

Naja naja kaouthia

DISTINCTIVE FEATURES: Medium-sized; smooth, shiny scales; wide head and neck; distinctive hood marking different from that of the spectacled cobra.

AVERAGE LENGTH: 1 m; **At Birth:** 20 cm; **Maximum:** 1.5 m (male).

DESCRIPTION: The skin of the Monocled Cobra is shinier, the hood rounder and smaller and the head smaller than is that of the spectacled cobra. The colour varies widely, from yellowish to greenish brown to black, with ragged bands. There is a conspicuous white monocle on the hood. The underside is yellowish white. Monocled Cobras superficially resemble Spectacled Cobras, but there are many small differences.

DISTRIBUTION: Monocled Cobras are a sub-species most commonly found in northeast India, parts of Uttar Pradesh, Bihar, Orissa and the Andamans, all of Bengal and Assam.

HABITAT: This cobra inhabits wetter areas than does the Spectacled Cobra.

HABITS: Monocled or as they are sometimes known, Bengal Cobras are mainly nocturnal. When disturbed, they will spread their hood and hiss at the intruder, but bite only as a last resort. As with most snakes, temperament varies among the cobras. While some seem docile and unexcitable, we observe that most are extremely active and quick. As always, they seek escape when allowed to.

YOUNG: Egg and clutch sizes are probably smaller than that of the Spectacled Cobra, eggs are laid in January-March.

FOOD: This sub-species is more inclined to take cold-blooded prey such as fishes and small snakes. They also eat rats and frogs.

STATUS: Extensively killed for its skin.

VENOM: The venom has been reported to be less toxic than that of the Spectacled Cobra. Haffkine anti-venom is effective for the bite.



King Cobra

VENOMOUS

26. King Cobra

Ophiophagus hannah

DISTINCTIVE FEATURES: Large; smooth, shiny scales; distinct light cross bands mainly on the forebody; large head scales edged with black.

AVERAGE LENGTH: 3 m; *At Birth:* 50 cm; *Maximum:* 5 m (male) (6 m in Thailand).

DESCRIPTION: The large head of the giant King Cobra is little wider than the neck. The head scales are edged with black and the overall colour varies from yellowish to deep olive-green but the tail is often jet-black. The underside is a lighter shade of the body colour. The yellow bands on the snake's back are more obvious in the light coloured specimens from Orissa and Uttar Pradesh. King Cobras are the largest venomous snakes in the world.

DISTRIBUTION: Rare in India, King Cobras are confined mostly to the dense forests of the Western Ghats and the northern hill forests. Nilgiris, Palnis and Western Ghats upto Goa, the Himalayan foot hills (upto 2000 m) starting near Lahore in Pakistan through North India to Assam. Forests of Orissa, Bihar, West Bengal and the Andamans.

HABITAT: In the Western Ghats and Assam, King Cobras usually occur in tea and coffee plantations of the lower elevations up to 1200 m above sea level. King Cobras seem to require special conditions of heavy rainfall and dense undergrowth; however, they are not confined to hills but also inhabit estuarine mangrove swamps in Bengal (Sunderbans), Orissa (Bhitarkanika) and the Andamans.

HABITS: Much has been written about the aggressive nature of this magnificent snake, but these accounts are more imaginative than factual. We have encountered King Cobras in South India and the Andamans, and in our experience they are timid

snakes, unwilling to attack and always seeking escape when possible. Two well-known field herpetologists from Africa, C.P.J. Ionides and J.H.E. Leakey captured 15 nesting female King Cobras and write, 'During the capture of the 15 females, there was never any sign of aggression before the grab-sticks had actually caught the snakes...these observations are quite contrary to popular belief and, we feel, go a long way towards proving that in normal circumstances a "broody" female King Cobra is not in any way aggressive.' In the field, King Cobras are awesome-looking indeed and both man and snake beat a hasty retreat. If restrained or injured, the snake may charge with open mouth at the aggressor, emitting a deep growl. King Cobras behave with an intelligence and awareness unusual in snakes.

YOUNG: Little is known about the breeding habits of the Indian King Cobras. In the Andamans, one was observed on her nest of 20 eggs in a bamboo thicket in June. Females scrape together leaves (often bamboo) with their body and construct a conical nest about 30 cm high. After laying her eggs at the bottom, she then coils on top of this leaf heap for the 2 months or so it takes the young to hatch, probably fasting the whole time. Her presence deters predators like the mongoose and the monitor lizard. King Cobras are the only snakes in the world known to build nests, though pythons and other snakes may coil about and even incubate egg masses.

FOOD: King Cobras eat mainly snakes, and occasionally lizards. The main prey seems to be large snakes like the rat snake and the checkered keelback. A 4 m male King Cobra at the Madras Snake Park ate fifteen 1.5 m rat snakes over a 4-month period. It took an average of 15 minutes to kill a rat snake and seemed to suffocate it by biting the throat, probably envenomating it as well.

STATUS: King Cobra's are rare snakes within their vanishing forest range and have an uncertain future. They are generally killed when encountered on plantations. They should be considered a threatened species and protected in India.

VENOM: The venom is slightly less toxic than the cobra's but the massive venom glands can contain up to 6 ccs of venom, enough to kill an elephant. Anti-venom is only available in Thailand. The only authentic case of a death from a King Cobra bite is

that of one Mr. Slater, an Englishman, who foolishly put his foot on a basking King Cobra's head and was bitten above the knee (JBNHS, Vol. 30, p. 706).

VENOMOUS

27. Hook-Nosed Sea Snake

Enhydrina schistosa

DISTINCTIVE FEATURES: Medium sized; rough, dull scales; body flattened and tail flat and paddle-shaped.

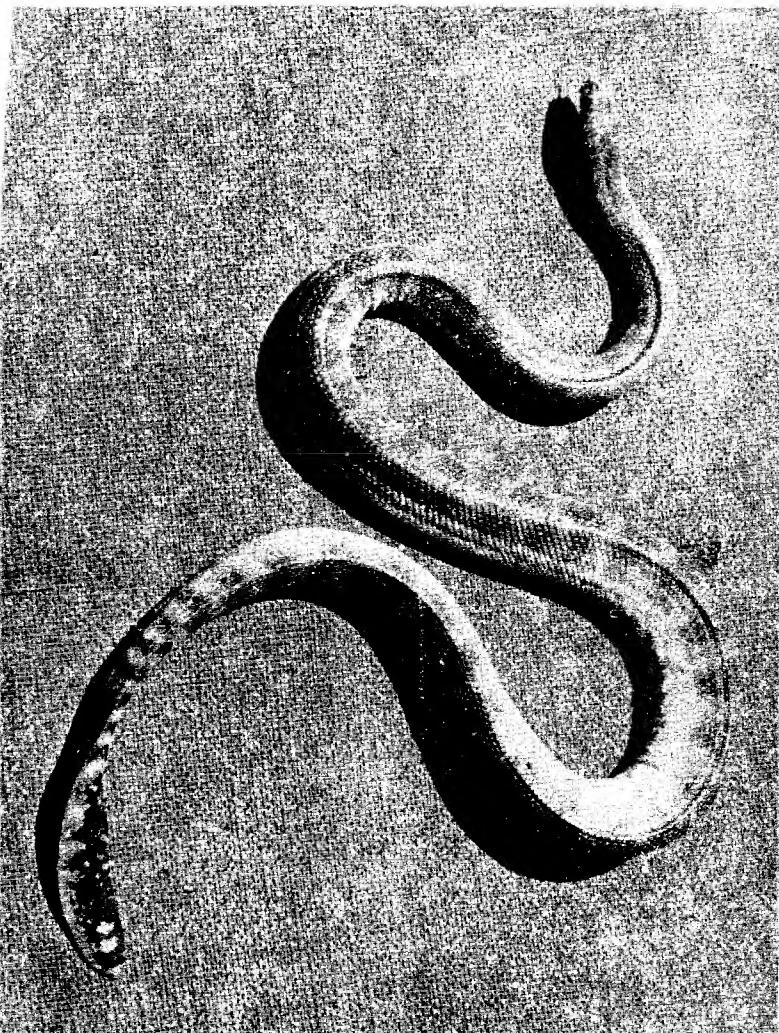
AVERAGE LENGTH: 60 cm; *At Birth:* 15 cm; *Maxmium:* 1.5 m.

DESCRIPTION: The Hook-nosed Sea Snake is a fairly short, stocky snake with a square nose and tip of the upper jaw protruding in a hook over the lower one. The overall colour is grey and there are dark round blotches on the back. The scales are coarse and granular. The bottom half of the body and underside are white. The tail is flat and paddle-like.

DISTRIBUTION: The coast and coastal islands of India. Hook-nosed Sea Snakes are the commonest of the over 20 kinds of sea snakes found in Indian coastal waters.

HABITAT: Seasonally found in the deep sea but seem coastal in preference and are often accidentally captured in inshore fishing nets.

HABITS: Very little is known of sea snakes in general. At the Madras Snake Park we have reared sea snakes of several genera. They seem to be active both day and night, rarely resting but continuously swimming around while awake. They can dive to about 100 m and stay underwater for a maximum of 5 hours. Sea snakes are equipped with glands to eliminate excess salt. Hook-nosed Sea Snakes are not feared by fishermen, who pick them from nets by the tail and throw them back into the sea. Like all sea snakes, this species very rarely bites and the incidence of deaths from bites is low. There is no known record of a sea-bather being bitten in India.



Hook-nosed Sea Snake

YOUNG: Except for the amphibious sea snake, all sea snakes bear 2 to 5 living young. (A small-headed sea snake at the Madras Snake Park gave birth to 4 living young on 24 April.)

FOOD: The principal food of Hook-nosed Sea Snakes is fish. The extremely toxic venom quickly paralyses the fast, slippery prey.

STATUS: Hook-nosed Sea Snakes are common and unexploited. Amphibious sea snakes are killed by the thousands near Hong Kong and Singapore for meat, and some other species are hunted for their skins.

REMARKS: Amphibious sea snakes, the egg-layers, sometimes come ashore in thousands to lay their eggs on small rock islands. This snake is common in the Andamans and Nicobars and comes ashore to nest and bask on the smaller islands.

VENOM: The venom of the Hook-nosed Sea Snake is rated four to eight times as toxic as cobra venom. Other sea snake venoms are almost equally toxic. Besides the usual disinclination to bite, sea snakes have a less efficient venom injection apparatus than do the vipers and cobras. Anti-venom for sea snake bite is made in Japan and Australia and is not available here.

VENOMOUS

28. Russells Viper

Vipera russellii

DISTINCTIVE FEATURES: Medium-sized to large; strongly keeled scales; distinctive bright chain pattern; large triangular head.

AVERAGE LENGTH: 1 m; **At Birth:** 24 cm; **Maximum:** 1.8 m (male).

DESCRIPTION: Russells Vipers are heavy, rough-scaled snakes with vertical eye pupils and generally a very bright pattern. The body colour is usually brown or yellowish and the pattern is composed of dark, round spots edged with white and black. The underside is white in the western, partly speckled in the



Russells Viper

southeastern and heavily speckled in the northeastern races. Colour variation is common, and the best recognition characters are the short, fat body, the triangular-shaped head and very regular chain-like pattern. Russells Vipers resemble the fat, harmless common sand boas which however have shorter and blunter tails and irregular body patterns. The bright symmetrical spots on Russells Viper's backs make them easy to differentiate. Russells Vipers are one of the Big Four dangerous snakes of India. The other large Indian viper is the Levantine Viper, a heavy brown snake found in parts of Kashmir which grows to $1\frac{1}{2}$ m.

DISTRIBUTION: Hills and plains throughout India upto 3,000 m.

HABITAT: Russells Vipers are equally at home in the open areas of the hilly country and the plains scrub jungle bordering farm lands. In very hot weather, they are found in termite mounds and rat holes but the more likely abodes are rock crevices, thick leaves, grass, thorn bushes and cactii. Favourite dwelling include pandanus bushes (Kewda) and century plants (*Agave*).

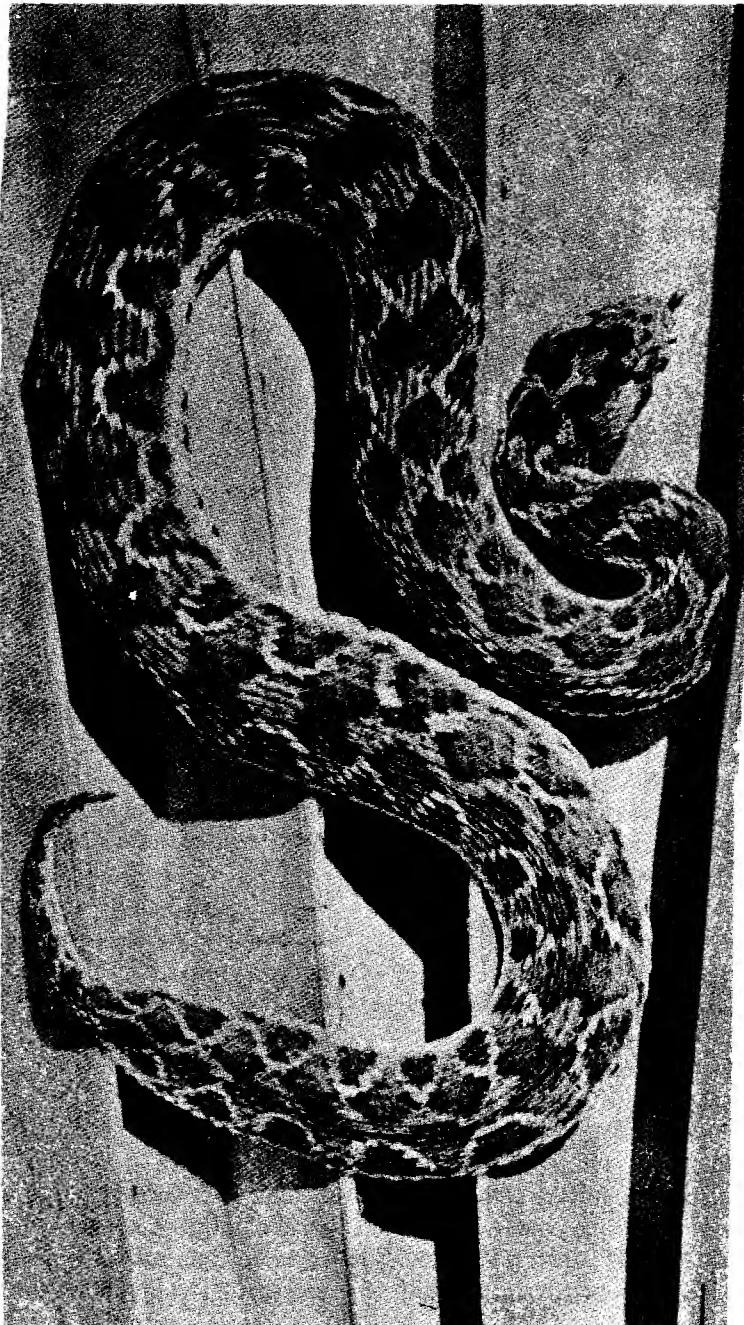
HABITS: Though Russells Vipers look sluggish, when provoked they are capable of very fast movements in short spurts. They hiss loudly and bite in defence. They are timid, and less likely to be commensal with man than the cobras and other streamlined snakes which are adept at quick escapes. Bites happen mostly to plantation, estate and farm workers who incautiously put their hands or feet in dense bushes, or step on a viper in the dark.

YOUNG: The female produces 20 to 40 living young mainly during May-July; these are exceedingly bright replicas of the parents.

FOOD: The young are cannibalistic (in captivity) and will also eat other snakes, lizards and mice, land crabs and probably scorpions and other arthropods. Adults seem to be entirely rodent eaters, probably catching an occasional bird. In southern India, they mainly feed on the Jerbil (*Tatera indica*).

STATUS: Russells Vipers form a major resource of the skin industry in South India, and in some areas have been completely exterminated through excessive all-season collection.

VENOM: The bite is considered one of the most dangerous of all Indian snakes and must be treated immediately with large amounts of anti-venom. The very toxic venom affects the blood and is used in medicine to control bleeding and in haematological studies.



Saw-scaled Viper

VENOMOUS

29. Saw-Scaled Viper

Echis carinatus

DISTINCTIVE FEATURES: Small; strongly keeled scales; head wider than neck; dull colour; cross mark on top of head distinctive.

AVERAGE LENGTH: South India: 30 cm; North India: 50 cm; *At Birth*: 8 cm; *Maximum*: 80 cm.

DESCRIPTION: A rough scaled snake with large eyes, wider head than neck and stocky body. The scales are heavily keeled. The body is brown, greyish or sandy with a darker zigzag pattern on the back and a distinct cross or lance mark on the head. The underside is white with brown speckles. The tail is short and stubby. Saw-scaled Vipers are the smallest of the Big Four venomous snakes and are less of a threat to man in South India because of the small size of the southern type. The northern form, however, grows large enough to be a potentially dangerous member of the Big Four.

DISTRIBUTION: Throughout India, mostly on the plains. In northwest India, Saw-scaled Vipers are reported from upto 2000 m in the hills. They are plentiful in certain areas such as Ratnagiri District in Maharashtra, parts of Punjab, Rajasthan, Tamil Nadu and Andhra Pradesh.

HABITAT: Dry, sandy or rocky terrain of the plains. Not found in heavily forested areas and usually not in the higher hills, Saw-scaled Vipers rest under rocks, behind bark, in thorny plants and other dry hidden places. Areas of laterite soil, boulders and light scrub jungle with small hills and open dry tracts are favourite haunts for this inconspicuous snake.

HABITS: Being mainly nocturnal, the 'phoorsa' rarely makes a daylight appearance except perhaps to bask in the sun after a cold, rainy night. They hide under rocks, bushes or in burrows during the day. It is specially active on very humid or rainy nights and frequents warm roads or beaten paths after dark.

It gets its English and Hindi names from the saw-edged keels of its lateral scales, which it rubs, producing a 'sshhh' sound similar to the hiss other snakes produce during violent breathing.

YOUNG: The female bears 4 to 8 living young between April and August, twice a year in South India. It is not known whether each female produces young every year in India.

FOOD: Mice, lizards, frogs, scorpions and other arthropods.

STATUS: Abundant throughout their range. Collected in large numbers in certain areas such as Ratnagiri District of Maharashtra for production of anti-venom at the Haffkine Institute.

VENOM: In areas where they are very common, Saw-scaled Vipers cause the largest number of venomous bites. Fortunately, the bite is rarely fatal as the snake is, in a large part of its range, small. A doctor in Ratnagiri District who treated 300 bites in 10 years reports only 2 deaths. The venom is a strong blood coagulant, which, after neutralizing the body's fibrin (clotting factor), causes a bleeding tendency similar to severe haemophilia or bleeder's disease. If a fatal dose is injected, it generally takes several days for the patient to die. Within this time it would normally be possible to treat the bite by measures such as anti-venom, transfusions, Vitamin K and calcium carbonate.

VENOMOUS

30. Bamboo Pit Viper

Trimeresurus gramineus

DISTINCTIVE FEATURES: Small; slightly keeled scales; green above; wide, triangular head; thin neck.

AVERAGE LENGTH: 40 cm; *At Birth:* 16 cm; *Maximum:* 80 cm.

DESCRIPTION: The Bamboo Pit Viper is a pale green snake with a faint, uneven black pattern on the back. The head is wide and triangular, set on a thin delicate neck. The scales on the top of



Bamboo Pit Viper

the head are tiny and the dorsal body scales are slightly keeled. Bamboo Pit Vipers are one of the most common of the green pit vipers of India. These pit vipers which are prominently green are mainly arboreal, living in vines, bushes and bamboo; but the many-coloured ones like the Rock Pit Viper are terrestrial, preferring rock cliffs, tree bases and stream edges. The different species appear to have elevational, temperature and humidity preferences.

DISTRIBUTION: Hills of India below a line drawn from Calcutta (in West Bengal) to Baroda (in Gujarat). Not found in the Western Ghats south of Goa. Another species, the Himalayan Pit Viper possibly sets the world altitude record for a snake, occurring upto 4,800 m in the Himalayas. There are 5 species of pit vipers in the Andamans and Nicobars, 5 in the Western Ghats and 8 in the Himalayas east to Assam.

HABITAT: Cool, thick vegetation near stream edges, bamboo and other dense jungle foliage.

HABITS: Bamboo Pit Vipers are slow moving snakes that are active at night and sleep in the open by day. They rely on camouflage for protection. They often grip a branch with their prehensile tail while resting and their resemblance to the green leaves makes it difficult to spot them. Although slow to defend themselves, they are capable of fast strikes and bites if injured or greatly disturbed. When frightened or cornered, they may vibrate the tail.

YOUNG: The female gives birth to 4 or 5 living young. The young have brightly marked tails which they use as worm-like lures to attract small frogs and lizards, a remarkable habit also observed in the New World pit vipers.

FOOD: Small Bamboo Pit Vipers feed on frogs and lizards; larger ones seem to prefer rodents but will also take frogs.

STATUS: All Indian pit vipers are forest snakes and the loss of dense forested areas, in particular of the evergreen rain forests, is reducing the populations of several species.

VENOM: Fortunately, pit vipers are fairly small and their venom is low in toxicity, so that bites are rarely serious. Bites are common in some plantation areas, but the patient is generally only incapacitated for a day or two.

General Facts About Snakes

There is more invented information and less factual knowledge about snakes than about any other subject in India. Stories are told about miraculous snakebite cures, the evil attributes of mythical species and just plain imagined nonsense. People believe that there are snakes with a head at each end which travel six months in one direction and six months in the other, or that cobras will turn up for their dish of milk regularly on Friday at *pooja* time. These beliefs are interesting and colourful; but the *truth* about



Venom extraction from a Cobra at Madras Snake Park

snakes is even more exciting. Did you know, for example, that pythons can ingest 400 times their daily energy requirements in one meal, or that snake venoms are being used to make life-saving drugs?

Most snakes are harmless and can be safely handled; however, some species are deadly venomous and all snakes naturally defend themselves by biting. Snakes have dry skins, often with a polished gloss that helps them travel fast, unhampered by limbs. Some move around only during daylight (diurnal) and others do so only at night (nocturnal). The coming of the rains makes all snakes more active.

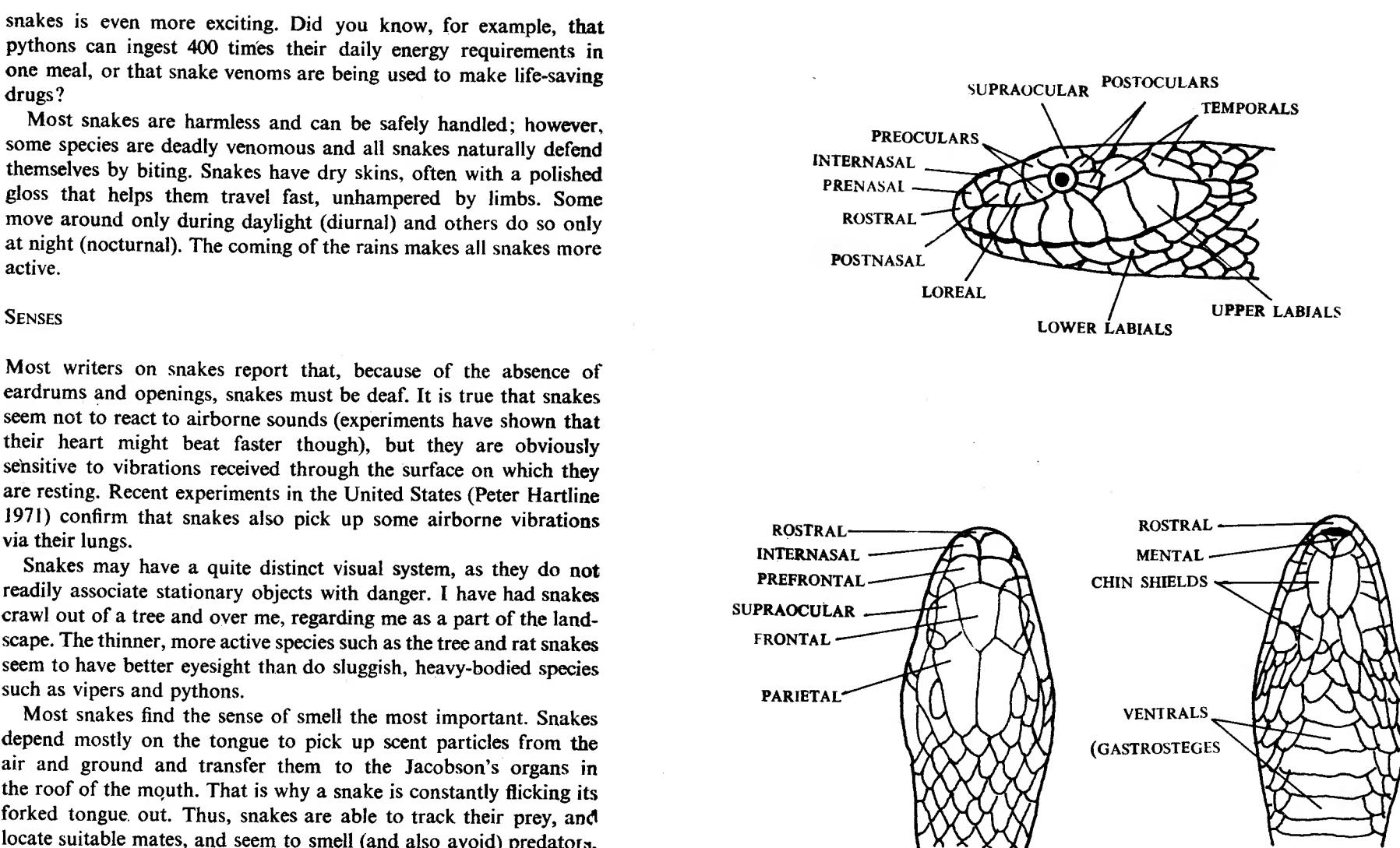
SENSES

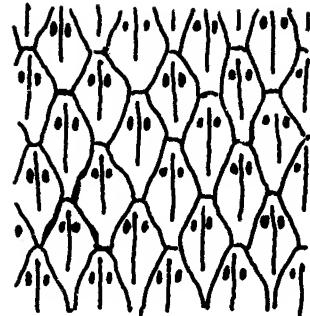
Most writers on snakes report that, because of the absence of eardrums and openings, snakes must be deaf. It is true that snakes seem not to react to airborne sounds (experiments have shown that their heart might beat faster though), but they are obviously sensitive to vibrations received through the surface on which they are resting. Recent experiments in the United States (Peter Hartline 1971) confirm that snakes also pick up some airborne vibrations via their lungs.

Snakes may have a quite distinct visual system, as they do not readily associate stationary objects with danger. I have had snakes crawl out of a tree and over me, regarding me as a part of the landscape. The thinner, more active species such as the tree and rat snakes seem to have better eyesight than do sluggish, heavy-bodied species such as vipers and pythons.

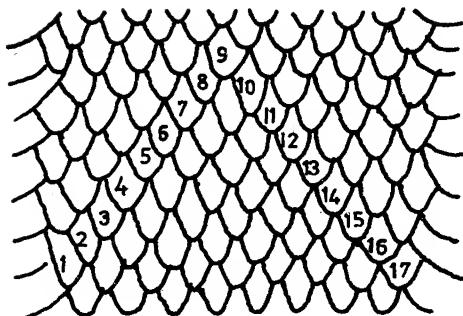
Most snakes find the sense of smell the most important. Snakes depend mostly on the tongue to pick up scent particles from the air and ground and transfer them to the Jacobson's organs in the roof of the mouth. That is why a snake is constantly flicking its forked tongue out. Thus, snakes are able to track their prey, and locate suitable mates, and seem to smell (and also avoid) predators, such as the mongoose and man.

Snakes feel pain and are acutely sensitive to and can suffer from changes in temperature and humidity. In fact, like all cold-blooded (actually ectothermic) animals, a snake's main pursuit is optimum temperature. Only when the body temperature is in just the right range will they feed, mate and produce offspring. When it is too

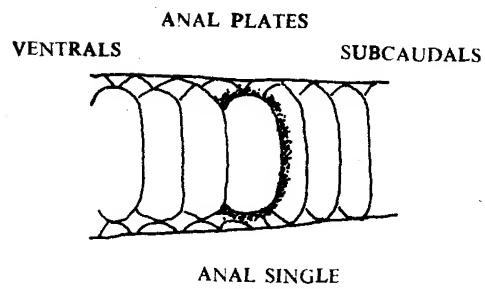




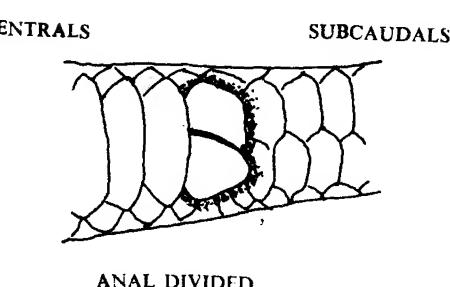
KEELED SCALES WITH APICAL PITS



METHOD OF COUNTING DORSAL SCALE ROWS

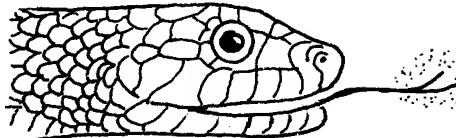


ANAL SINGLE

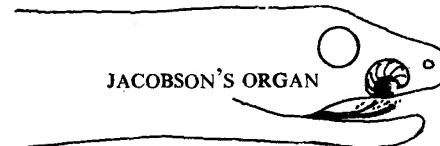


ANAL DIVIDED

Scalation (nomenclature)



1. TONGUE IS FLICKED OUT TO PICK UP CHEMICAL PARTICLES FROM THE AIR.



2. TONGUE IS WITHDRAWN TO A POINT UNDER THE JACOBSON'S ORGAN FOR TASTE-SMELL ANALYSIS.

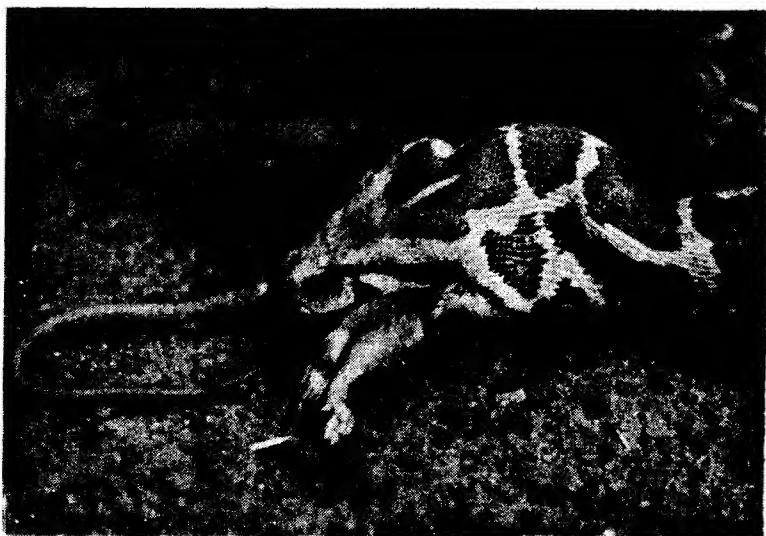
Tongue and Jacobson's organs

cold, the snake's metabolic rate slows down and it becomes too sluggish to pursue its prey or escape its enemies. When it is too hot, it becomes torpid, dehydrates and dies.

FEEDING

A snake stores up fat in its body and some snakes can exist for many months without eating. Usually, however, snakes feed once every few days. Most large land snakes feed on mice, rats and frogs; water-snakes feed on fish and frogs and sea snakes on fish and eels. Kraits and king cobras are exceptional in being mainly snake-eaters. Small snakes and the young of some larger species feed on lizards, insects and their larvae, scorpions and earthworms. We know very little about the kinds of lizards or scorpions, insects or worms, preferred by particular snakes.

The manner of obtaining food differs greatly among species. Venomous snakes like cobras and vipers are equipped with a remarkable injection apparatus that lets them catch and kill their prey. Harmless snakes such as rat snakes, watersnakes and striped keelbacks catch their prey and simply swallow it alive; however, many 'harmless' snakes actually have venom that can immobilize the insects, fish, frogs and lizards on which they feed. Some nonvenomous snakes such as the python, sand boa and racer ambush their



Like many other snakes the Python is a great rodent eater.
Here, a young python engulfs a bandicoot



A King Cobra eats only snakes. Here, a harmless Rat Snake is about to be swallowed

of some species of snakes is actually a ritual combat between male snakes and not mating as is often reported. It is likely to result from a sort of territorial dispute, though no one is quite able to explain this activity. Dances are seen in many kinds of snakes and even in some monitor lizards. In captive kraits, the combat often becomes more cannibalistic than ritualistic, with the smaller male becoming a meal for the 'victor'.

Fresh-water snakes, cobras, pythons, and rat snakes, among others, lay eggs; vine snakes, vipers, sea snakes, sand boas and others bear living young, actually incubating the eggs internally. The period between mating and egg-laying is about 60 to 80 days, which is also the average incubation period for most reptile eggs in the tropics (although some take over 100 days). The female usually lays her eggs in a suitable shelter such as a rat hole, termite mound, hollow tree, under bark or rotting leaves, and there deserts them. Cobras, checkered keelbacks, kraits, pythons, king cobras and probably others stay with the eggs for at least part of the incubation period. The female king cobra goes so far as to scrape together an elaborate nest of leaves, in the bottom of which she deposits her eggs. The brooding female python raises her body temperature by twitching muscles.

The babies release themselves from their leathery eggs by slitting the shell with their 'egg tooth', a special outward protruding tooth on the nose-tip that is later lost. When the young snakes hatch, the female generally deserts them. The tiny snakes are fat with unabsorbed yolk and generally stay grouped together for up to a week before dispersing. Many new-born snakes are no bigger than large earthworms and are vulnerable to a vast array of predators such as birds, mongoose, monitor lizards and even frogs. A new-born snake has a slim chance of survival and depends on its secretive instincts, camouflage, mimicry of dangerous species and, at times, on pure bluff to get it through this most critical period of its life. If plenty of food is available (and there usually is, as evolution has matched the young's emergence to the availability of food, for example, maturation of tadpoles) the little snake grows fast, doubling in size in the first two or three months. A captive Indian rock python grew from 1 m to 3.5 m in a little over 2 years! Juvenile snakes are usually replicas of the parents but many may look quite different, a confusing point to someone attempting to identify snakes. These exceptions have been mentioned in the descriptions of the 30 species in this book.

A young snake grows too large for its skin once every month or two and has to crawl out of it, or 'shed'. During the week or so prior to shedding, the snake is listless and the colour and the eyes become cloudy or bluish. Just before shedding, the eyes clear up again and the snake tries very purposefully to rid itself of the old skin as if it were irritating. Just the outer layer peels off, leaving the snake shiny and new-looking. Snakes also shed eye-caps (which come off with the skin) and (at other times) teeth, fangs and even tongue-tips (keeping the tongue always sensitive).

No one knows the life-span of snakes in the wild; this is another of the many things we do not know about these diverse reptiles. The following are some interesting longevity records for Indian snakes kept by individuals and zoos in the U.S.A.:

<i>Snake</i>	<i>Years</i>	<i>Months</i>	<i>Institution or individual</i>
Indian Python	34	2	Eugenia S. Shorrock
Common Sand Boa	13	10	Philadelphia Zoo
Indian Rat Snake	10	7	Staten Island Zoo
Banded Krait	11	6	St. Louis Zoo
Indian Cobra	21	6	Lincoln Park Zoo
Saw-scaled Viper	10	3	San Diego Zoo

LOCOMOTION

Most snakes can climb and almost all can swim. One snake even takes to the air and glides (see flying snake). Many tree snakes like the bronzebacks are specially adapted for climbing and have notched belly scales and thin, strong bodies. Sea snakes use paddle tails for propulsion and can hold their breath for up to 5 hours. Some earth snakes like the sand boas and shieldtails have strongly constructed heads with a shovel or pointed shape, specially for burrowing.

Prof. Carl Gans, the authority on biomechanics, writes the following about locomotion in snakes:

Snakes move by one of four different methods, which vary in the way that friction between their body and the surroundings is utilized. All snakes can use the first two methods, but only a few use the last two, and even then the methods used may differ between the front and the rear of the body and may change as snakes grow older (and heavier) or when they are excited.

In the first method, undulant or serpentine motion, the snake forms its body into a curve-like multiple S's and pushes the loops sidewise and backwards against protruding parts of the ground, such as grass stems, pebbles, and small rocks, or again twigs, branches and bits of bark. The weight of the body is then transmitted through the sliding ventral surface while the forward push is exerted through the sides of the travelling loops. The waves pass from head to tail, similar to the movements used in the swimming of most fishes. Snakes may also move by concertina movement, in which part of the body remains stationary on the ground, while the rest stretches outward to a new stationary site, where the head and neck may coil and then pull the rest of the trunk along. Tree snakes may use this method by constricting a branch and then shifting to a new place at which they in turn constrict before pulling the rest of the body up like a loose rope.

In rectilinear motion, found mainly in pythons and some of the fat-bodied vipers, the skin has been loosened from the ventral surface of the body and long muscles can pull it forward and backward, sliding like a loose sleeve over the underlying vertebrae, muscles and viscera. A portion of the skin will be pulled far anterior on the body, and then pushed against the ground, providing a firm place of contact. Muscles connecting this ground-contacting skin to the ribs will then contract and pull the body forward. Once the muscles have contracted to their minimum, the skin is pulled out of contact with the ground by a second set of muscles and shifted more anteriorly on the snake. Repeated cycles cause caterpillar-like shifting of the belly skin and the snake then moves in a straight line, giving the method its name. The final and most spectacular movement is sidewinding normally found only in a few desert vipers though some very excited snakes may also utilize a variant of it. In this, the snake lifts part of its body from one position through the air to a new one, rolling along from track to track. It is advantageous primarily for fast and continuous travel over smooth, shifting sands where there are no lateral projections against which to push and where the surface may be so hot that close contact is undesirable.

ENEMIES AND DEFENCE

The eggs and young of snakes are eaten by a regular army of
c-4

predators from ants and beetles to rats, mongoose, monitor lizards, water birds and birds of prey. When adult, most large snakes are only persecuted by man. Smaller species are captured by the mongoose and birds of prey. The mongoose is the snake's proverbial enemy. It is true that this voracious little beast will attack anything that moves, provided it is small enough. We have observed our pet mongoose catch a snake (kukri) right from under the foot of a person who had accidentally stepped on it. We know that the snake was harmless. If a parallel incident had occurred in someone else's garden, it would certainly increase the acclaim that the mongoose saves humans from the bites of deadly snakes.

Snakes have many defence mechanisms, different ones for different predators. Some (notably the Russells viper, pythons and royal snake) hiss by forcefully inhaling and exhaling. Some expand their necks and bodies to scare away intruders. The cobra, of course, has the most dramatic display, but even the harmless watersnakes can rear and puff themselves up to look dangerous. Some snakes just stay still and hope that enemies will pass without noticing them. Others will freeze, kinking their body, evidently to diffuse the outline and blend in. When actually caught, a snake may defecate, spray musk or even vomit. Some, like kukris and worm-snakes attempt to poke with their tail-tips; this probably gives rise to the erroneous stories about snakes with stingers. Whatever the defence, poisonous snakes do not attack animals as big and dangerous as man and generally bite only as a last resort when teased, stepped upon or injured. A snake's most important defence is its ability to keep out of sight; even where snakes are common, they are rarely seen. Some snakes appear to change their habits to avoid contact with man, for example by becoming more nocturnal in movement.

SNAKE-CATCHERS

In India, snakes are killed by some and worshipped by others. Generally, they are feared. As in most parts of the world, few people take a calm and logical view of this amazing group of reptiles, and few accept the idea that snakes are valuable and useful. The actual economic value of snakes as rodent destroyers should be enough for them to deserve our protection.

While most people keep well clear of snakes several groups seek

them for various reasons. The first, and usually the most knowledgeable snake-catchers are tribal people like the Irulas of Tamil Nadu and Andhra Pradesh. For the past four or five generations, they have been the main suppliers of snakes for the once enormous skin industry. In Pudukkottai (Tamil Nadu) and elsewhere, other local people such as the Amblakaran and Muthurasa also catch snakes for skins, but with far less finesse. Irulas find snakes by their perfect knowledge of natural history. They identify the species from tracks, droppings and shed skins, trace it to its burrow and dig it out with uncanny precision. An Irula may average 2 to 5 big snakes in a day in a good area that has not been heavily hunted.

Dipak Mitra, a young herpetologist from Bengal writes, 'In Bengal people dealing with snakes (catchers and charmers) are known as "Shapurhia". They are of both Hindu and Muslim religion and they also carry the surname Shapurhia. All over Orissa they are known as "Kerha". The Oriya snake charmers are mostly Hindus and their surname is "Das". A large colony lives at Patia village near Bhubaneshwar. In Bengal catchers catch snakes mostly for charming, and also for skins.' Not many people in India will eat snakes though perfectly safe and nutritious. However, the Chakmas and Mizos and other tribals in Northeast India will kill and eat any large snakes they encounter, venomous or not.

In Ratnagiri District, Maharashtra, the Mahrs have been catching and supplying thousands of saw-scaled vipers each year to the Haffkine Institute for their anti-venom needs. The catchers use long forceps made from bamboo and carry a stick with a spike driven through it for turning over stones. A fast-walking Mahr can get upto 30 or 40 vipers a day, but will not touch any other species.

The 'snake-charmers' often do not actually catch their snakes but buy them for their roadside shows from local tribal catchers. Some snake-charmers are good sleight-of-hand artists, but they rarely know much about snakes. Venomous snakes are generally defanged or devenomized. The tradition of snake-charming is picturesque, but these showmen unfortunately spread fearsome stories to enhance their dramatics and thus contribute to the fear and superstition about snakes so prevalent in India. There is a whole village of such 'charmers' just outside Agra and another in Orissa, but in the rest of India they are scattered and nomadic. In the larger cities, several have staked out a 'territory' near big hotels and other

central spots, sometimes supplementing the act with the sale of snakebite and scorpion sting 'remedies'. Another kind of 'snake-charmer' visits homes and announces that the garden looks like a very likely place for snakes. The owner nervously agrees to pay for having these removed. Within half an hour of pipe-blowing and sudden disappearances behind bushes, the charmer has produced no less than 50 snakes. Close examination would reveal them to be his snakes, brought with him.

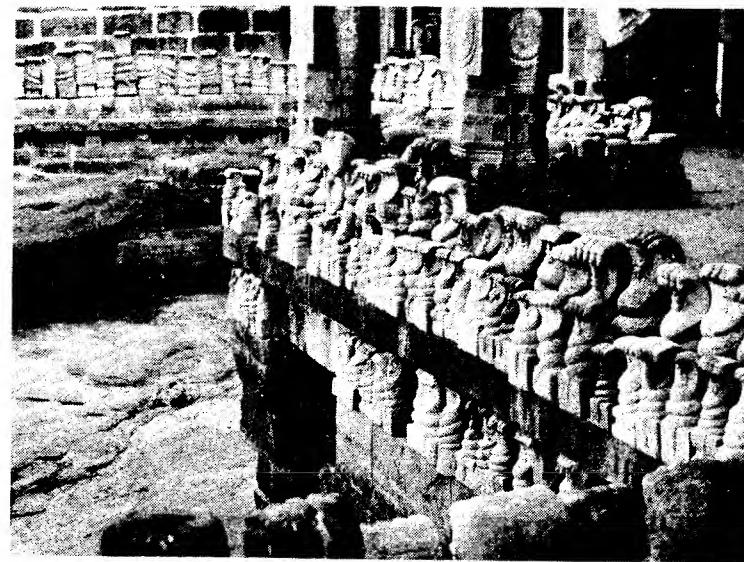
The snake festival of Nagpanchmi comes around August. Most Hindus celebrate it by performing *pooja* to snake images at the temple and at select termite mounds, the traditional home of the cobra. Not so the farmers of Battis Shirala in Maharashtra. The story is that many years ago, they were given protection from snakebite by a *guru*. Thus, every year the farmers catch and worship several hundred cobras, along with rat snakes and banded racers. The snakes are kept in earthen pots and carefully handled during the two day festival; they are released unharmed. It is educational to see the confidence and snake-handling skill of these ordinary farmers who implicitly believe that they are protected.

'Snake temples' occur throughout India. They rarely contain live snakes; instead, one sees plenty of stone carvings. Some *swamis* keep a cobra or two for dramatic *poojas*, but India does not have temples filled with snakes, such as the pit viper-laden one in Penang, Malaysia.

CONSERVATION OF SNAKES

Snakes should be called 'the farmer's best friends'. No other animal is so perfectly suited to pursue and trap rats right down their holes. Most people are unaware how destructive rats really are; Dr. Salim Ali, when explaining the value of rodent-destroying birds, mentioned that 20-50 per cent of India's grain crop is destroyed by rodents! The mechanical damage caused by rats is incredible; one tea estate in the Nilgiris reports Rs. 5 lakhs damage due to rats each year. (The jungle around this estate had been cleared, eliminating rat predators such as snakes and birds of prey.) Not poisons, traps, nor other predatory animals can effect the rodent population as much as do snakes.

Once people are able to tell the few dangerous snakes from the great number of harmless ones, they are freed from the fear of all



Snakes stones at the Perayur Temple in Pudukkottai. Each stone is a woman's hopeful offering for a male child



Year round, slaughter of snakes for the skin industry has seriously affected snake populations in some parts of the country

snakes. In many areas, people recognize the rat snake and realize its value as a rat killer. Hence, no one is allowed to molest it. Unfortunately, this enlightenment does not keep rat snakes from being one of the main species killed for the skins. This massive wastage of rat snakes appears to defeat the purpose of our elaborate and costly efforts to improve the food output. A single rat snake will kill and eat hundreds of rats and mice in one year!

Even the most insignificant of snakes has its vital niche and role in the maintenance of a natural environment. We cannot here go into the details of the ecological relationships within each natural community. Indeed, one must admit that no one really knows the full significance of each snake in nature. The unravelling of the mysteries of the natural history of snakes will take a lot more time and concentrated effort. It may be most easily accomplished by trained zoologists aided by tribals. Understanding the nature and role of these animals may be the first step toward changing the common, destructive and wrong attitudes about them.

Snake-skin exports during a peak year

March 1968		April 1967-March 1968	
Quantity	Value	Quantity	Value
17,522 kg	Rs. 7,175,116.00	358,413 kg	Rs. 107,651,889.00

Given a rough value of Rs. 10 per skin, no less than ten million rat snakes, cobras, pythons and others were killed for the industry during this one year. The snake-skin industry means employment for the tribals, but as there is no control on numbers and season and since the middlemen get the major profit at this end, it is both ecologically and economically unsound.

A snake-skin or snake-venom industry can only be justified in India if run by a Tribal (snake-catchers) Cooperative under continual scientific monitoring and advice. The benefits of the industry must be carefully weighed against the rodent-destroying value of snakes. Another question is the enormous wastage of material, as only the snake's skin is taken. Perhaps the Tribal Cooperative could feed snake carcasses to crocodiles on a cooperative farm!

RECENT WILDLIFE AND EXPORT LAWS CONCERNING SNAKES

The Wildlife (Protection) Act of 1972, now in effect in most of the States of India, protects only one snake, the Indian rock python.

Even this species is not given full protection and permits for procurement and commercial use of its skin can be and are issued by State Chief Wildlife Wardens. The Export Policy for Wildlife Products (1975-76) is a more protective legislation for Indian snakes. Under the new laws, export of all snakes or their products (venom, skin, etc.) are normally not allowed. Special licenses for export are only issued for scientific research and so on. Other snakes, under pressure from habitat destruction such as the king cobra and lesser rain forest species are being suggested to the Government for protection of their habitat.

COLLECTION AND STUDY OF SNAKES

Perhaps you have a greater than average interest in these strange legless animals called snakes. The old saying 'ignorance is fear' may apply and the more you learn about snakes, the easier it becomes to understand and even to like them. If you decide to study snakes (whether as a school or college project or on your own) you should not plan to go around grabbing cobras and leaping on vipers. Only nonvenomous snakes should be caught or handled. And the first lesson in handling nonvenomous snakes is to make absolutely sure that the snake is nonvenomous. Venomous snakes should neither be handled nor kept at home, as the possibility of an accident is too great.

Finding snakes is difficult at first, but if you live in a suburban or farm area, you need only spread the word that you are interested in living snakes and soon people start calling you to help remove a snake from a well, haystack or palm leaf roof. With experience, you will eventually learn the likely places for snake-catching. If it is the dry, hot season, one looks around cool, damp areas; during monsoon-time, one looks in the high and dry places. Cobras may live in rat holes, kraits prefer brick piles, tree snakes like certain trees and bushes, and watersnakes are easily caught at night with a flashlight. These are the kinds of things one learns with experience and with the help of catchers like the Irulas. Though a greater variety of snakes occur in the jungle, these are much more difficult to find than those in open paddy fields with bushy borders. Rats and mice are over-abundant in farmlands; the snakes then congregate in the dams, paddy *bunds* and in whatever bushy patches to escape the plough.



Bagging a venomous snake



Handling a nonvenomous snake

As snakes are active at different times of the day and night, a serious snake observer will walk slowly around an area at morning, noon and night hours during different seasons. It may seem unrewarding at first, but patience and close observation can make anyone a student of snakes, or ophiologist. Like any good predator, you will be able to read the tell-tale signs of the presence of your prey; shedded skin, dung and (eventually) the obscure messages of snake tracks. Bagging a snake is a little tricky at first, but experience is the best teacher. If one is fairly sure a snake is in a hole, a thin, flexible stick can be inserted as far as it will go to try and reach the snake. The snake will move if touched, causing the stick to move also, and you will know how deep the snake is. Though sometimes snakes go very deep, as when they seek refuge in a termite mound, they are often only two or three feet inside a rat hole and can be dug out with a little careful effort. Do not cut the snake in half as you dig!

Snakes can be kept in cloth bags for a day; insert some green leaves and keep the bag out of the sun. Never keep venomous snakes. If you wish to keep a snake for a long time, choose one of the less nervous species like sand boas, striped keelbacks or trinket snakes. Small snakes can be raised in a modified aquarium or specially made cage. You should provide water, leaves, sand and rocks, and perhaps a branch to climb on. The snake should get at least half an hour of sun every morning and its cage should be kept very clean and dry. Snakes tend to scrape their noses on wire mesh, so perforated aluminium sheeting is far better for cages. Keeping live snakes is a big responsibility; one which is injured or tries to escape all the time should simply be released.

Keeping snakes as pets and for study is quite popular in Europe and the United States and important observations on snake habits, natural history and diseases have been made by amateur snake-keepers. Giving these generally feared reptiles a new place in the minds of people is an important undertaking and a gratifying accomplishment that starts at home.

MYTHS AND BELIEFS

In India, each village and area has its peculiar, usually detrimental beliefs and myths about snakes. These stories should not be confused with reality. Below is a sampling of the wealth of snake folklore:

1. A small snake of Kashmir is supposedly so deadly that it melts the snow as it passes!
2. It is said that if you kill a snake, another (its mate) will follow you and take revenge. That, of course, is wrong, but may have some basis in fact. When you kill a snake it expels its musk from the anal opening; it is very possible that a nearby snake may show up to investigate what the musk (a sex-attractant) is all about.
3. Snakes are supposed to like milk. Where they would find it in nature, how they would obtain it with no powers of suction and with over a hundred sharp teeth in the way, and of what nutritional value a few spoonfuls of milk would be to a snake, are questions that should be considered.
4. Snakes are said to dance to music. Even though it is now proven that they can detect some airborne sounds, there is no evidence that snakes can appreciate music. In fact they instinctively stay away from artificial vibrations. The music of the snake-charmer only serves to charm the audience.
5. The poor Irula tribal snake-catcher has a good answer to the legend of the jewel or light in the head of a snake. When asked about this belief an Irula will reply, 'if it were so we would be rajas, not snake-catchers'.
6. People often claim to have seen snakes with whiskers or something like a cock's comb on the head. These may represent either the fakery of a snake-charmer or it might have been a snake just starting to shed its skin; the skin peeling back from the upper and lower jaws certainly looks very odd.
7. The vine snake is accused of poking one's eyes out or 'stinging' one on the forehead. Actually, the pointed nose of this harmless snake is soft and rubbery. The vine snake can inflict a painful (but harmless) bite on a finger or even a nose, but no one has ever received an eye injury.
8. The lick of a common sand boa is said to cause leprosy. Since this harmless snake has a body pattern that vaguely resembles that of patients suffering from this dreaded disease, people are quick to make the association. Actually, snakes are clean and free of disease.
9. In the South, bronzeback tree snakes are not only accused of being venomous—but after biting they supposedly climb a tall tree to observe the funeral pyre of the victim!
10. The tails of rat snakes, despite the various stories about them,

are no more dangerous than pieces of rope and do not have stingers, do not suffocate cows, lash down paddy and so on.

11. Bites by a snake with rings on its body does not give the victim's body a ringed pattern.
12. In northwestern India, kraits are supposed to suck a man's breath away as he sleeps. This is perhaps the farmer-labourer's explanation for the respiratory paralysis that a severe krait bite brings on.
13. In Maharashtra, the little earth-bound saw-scaled vipers are believed to jump through the air for 6 feet or more. Six inches would be more accurate.
14. Along the West Coast, it is considered lucky to have a cobra in one's compound, and in Kerala, many Hindus have a shrine and place of offering for their 'family cobra'.
15. Cobras are believed to mate with rat snakes, but they in fact mate only with their own species and generally keep away from the larger and sometimes cannibalistic rat snakes.
16. There is a myriad of myths about snakebite treatment, from chanting *mantras* to magic herbs and even magic phone calls. There is only one effective treatment for snakebite in India and that is anti-venom serum or anti-snakebite serum. The other 'remedies' are useful to relieve fear and treat shock, but should never be substituted for or interfere with the anti-venom treatment (see Snakebite).
17. The red sand boa has an extremely blunt tail; thus, there are several popular stories about 'two-headed snakes'. Just as it fools the mongoose and other predators into attacking its tail while the head seeks escape, a large percentage of humans are also fooled.

would reduce fatal snakebites to a fraction of the present incidence.

FIRST AID

1. Keep calm, do not let the patient get excited.
2. Immediately tie a cloth as tourniquet (on the upper arm for a hand-bite, upper leg for a foot-bite); tie it or twist it tight enough to restrict most of the blood-flow. (You should be able to insert one finger under the band.)
3. You may give an aspirin, a *small* peg of brandy or a harmless injection if available, for reassurance; shock from fear is very dangerous.
4. Carry the patient immediately to the nearest source of anti-venom serum. Do not let him exert himself. Treat for shock (raise legs, cover with blanket).

Note: If the patient vomits, he should be turned on his side or front to avoid inhaling and choking.

SYMPTOMS

As is usually the case, the snake is not seen or identified and one must rely on observing the symptoms of the patient. If there is no pain or swelling of the bitten area, the chances are it was nonvenomous (however, see krait). The symptoms of shock (cold sweat, faintness, nausea) must not be mistaken for symptoms of poisoning. The following is a listing of the average symptoms of bites from the Big Four which can be useful in treatment and determining which snake was responsible.

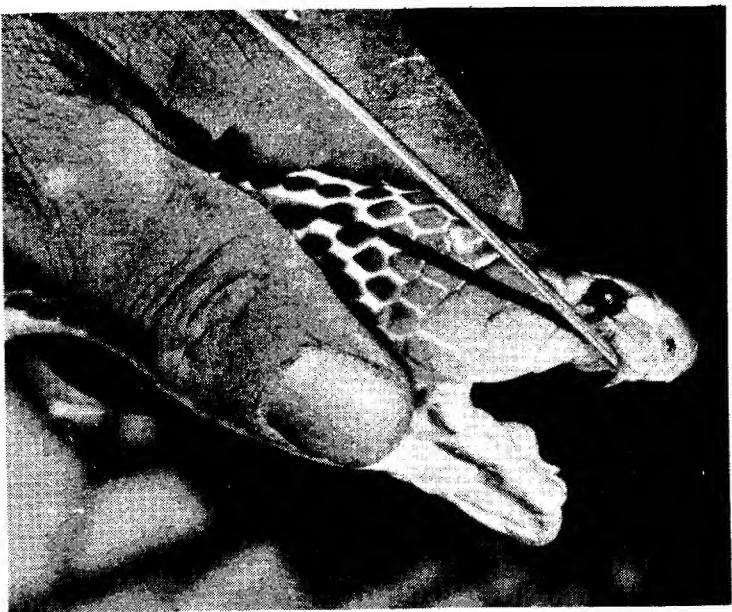
COBRA

Cobra venom is of the neurotoxic type; it paralyzes the motor nerve centres causing death by stopping the breathing and heart failure. Typical symptoms of cobra bite are:

1. Local pain (may be absent).
2. Swelling (sometimes after one or more hours) and sometimes ulceration (later possibly necrosis).
3. Blurring of vision.
4. Ptosis (drooping eyelids, unsteady on feet).



Tourniquet should be applied immediately after the bite and released very gradually while the anti-venom is injected



Short, fixed fang of the Cobra. The venom gland is located behind the eye; a venom duct takes the venom to the fang



Swelling from a Cobra bite. A Krait bite does not cause such swelling but can be much more serious

5. Thick feeling of tongue, slurred speech, salivation.
6. Drowsiness, incoordination.
7. Breathing difficulty, sometimes coma, convulsions.

COMMON KRAIT

The fangs of the krait are short, and the venom is very toxic, perhaps six to eight times as toxic as that of the cobra. Typical advanced symptoms (3 to 5 hours) of krait bite are the same as of the cobra with these exceptions:

1. Usually no local symptoms of pain or swelling (this is the misleading and dangerous part of krait bite).
2. Symptoms may not appear for several hours following the bite—their onset may be sudden and rapid.
3. There may be severe stomach and joint pains (6 to 12 hours). Krait bites happen usually at night. Since the snake is rarely seen, it is always sensible to take nocturnal victims of snakebite to the nearest source of anti-venom treatment (doctor or hospital) *without delay*. There is a folk belief that, if bitten at night, the patient will die before daybreak. If it was a serious krait bite and no anti-venom was given, it would be quite true.

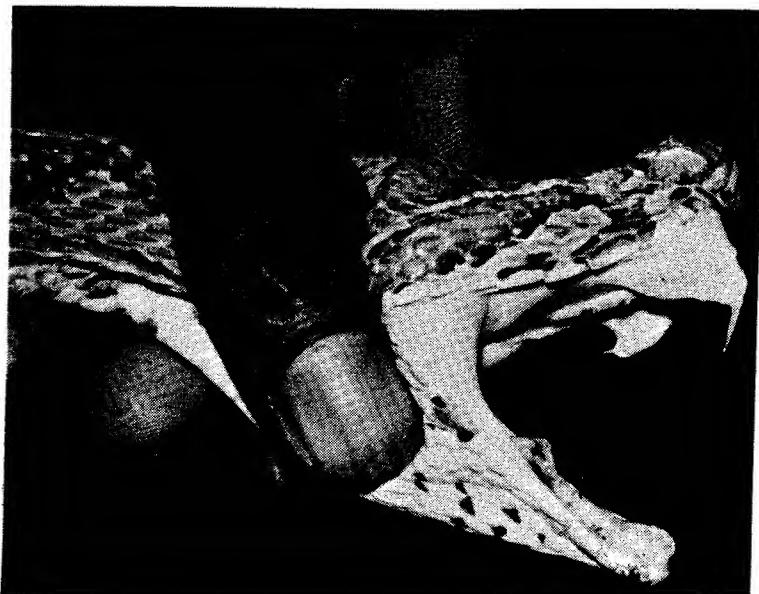
RUSSELLS VIPER

The fangs of the Russells viper are over a centimetre in length and the venom is blood-affecting, causing blood clots, non-coagulability of blood and tissue damage. Its venom is one-third as toxic as that of the cobra, but the size of the venom glands and fangs contributes to the severity of Russells viper bite:

1. Immediate and persistent burning pain.
2. Rapid swelling, often becoming massive within two hours.
3. Discolouration of bitten limb, bruised spots, blisters.
4. Nausea, weakness, agitation.
5. Blood in sputum, vomit, urine, faeces.
6. Visual and breathing difficulty.
7. Loss of blood; uremia (kidney failure) after 24 hours.

SAW-SCALED VIPER

The fangs of the saw-scaled viper are large for a little snake but



Long, hollow, folding fang of Russell's Viper. This is nature's hypodermic needle



The only effective treatment for a serious venomous snake bite; Haffkine anti-venom serum by intravenous injection

are easily deflected by clothes or shoe leather. The venom has a powerful clotting action and is more toxic than that of the Russell's viper. Fortunately, the amount of venom injected is usually very small. Typical symptoms of severe saw-scaled viper bites are:

1. Burning pain (may be only slight); later pain in arm and leg joints.
2. Swelling within 2 hours, sometimes massive, especially in foot-bites if the victim has walked or run after bite.
3. Bleeding from gums; bleeding from cuts; blood in urine.
4. 12-24 hours later, evidence of internal bleeding.
5. Anaemia, weakness from loss of blood, possibly heart failure.

NOTE: Swelling may be caused by tight tourniquet. This swelling, resulting from restricted blood-flow, is cool to the touch, whereas swelling from venom reaction is warm.

ANTI-VENOM SERUM

The serum which can neutralize snake-venom, called anti-venin or anti-venom is made at the Haffkine Institute, Bombay, by immunizing horses. A mixture of the venom of the Big Four (highly diluted) is injected into horses in gradually increasing doses. When a horse reaches a certain level of immunity some of its blood is drawn, spun down and the serum (fluid part of blood) taken and freeze-dried. Tested and packed in 10 ml doses, this is the anti-venom serum effective against the venoms of the four common dangerous snakes of India. Anti-venom is also made at the Central Research Institute, Kasauli, H.P.

Anti-venom keeps for five years without refrigeration; it can and should be stocked in all rural areas where snakes are plentiful. Some people are seriously allergic to horse serum and (keeping adrenalin handy) a test dose should be given first. Detailed instructions on how to use anti-venom are provided with each kit. If the use of this life-saving serum was publicized in India, snakebite deaths would be greatly reduced.

COUNTRY REMEDIES

In early times, the bite of a snake must have seemed the epitome of a sudden blow of Fate or the gods. Even today, snakebite arouses fatalism and superstitious fear in many areas. Quack doctors and

country remedy men have always made their fame and fortunes by catering to snakebites with all kinds of strange 'cures'. These are not confined to India; one hears from all over of cures that may kill the patient unless the venom does so first. There are five basic categories of country remedies in our country.

(A) MANTRA (CHANTING)

This may be performed by a professional snakebite healer or perhaps a religious man who feels he has the gift, and more important, who has a reputation of at least a fair amount of 'success'. *Mantra* cures seem to be the equivalent of what is known as faith-healing among Christians. Since most snakebites are non-fatal, the *mantra* has a high percentage of success and the canny *mantric* is always able to come up with a convincing excuse for the occasional failure (i.e., the rare, truly bad bite).

(B) STATION MASTER

No one knows how this started, but for generations the extraordinarily widespread and accepted story goes: 'Just send a wire to or phone up the Station Master of X railway station and by the time his return cable arrives the victim will be okay.' We have unsuccessfully tried to track down the elusive Station Master(s) who apparently dates from the early 1900s! Needless to say, this is another case of psychological 'cure' of non-lethal bites.

(C) SNAKE STONES

Among the favourite old-time snakebite cures of Kerala and Sri Lanka are the snake stones, which are charred and polished pieces of bone. One of these is applied to the site of the bite where it sticks and 'draws out the venom'. The stone is then soaked in milk to 'detoxify' it. In India, these stones are sold by travelling snake-charmers and in Elpitiya, Sri Lanka there is a regular sales outlet for snake stones. An excellent money-maker, the snake stone is useless as a device for removing venom deeply injected into tissue. In fact, the old cut and suction technique of snakebite treatment may often be no better. In the case of viper bites, a victim can bleed to death from deep cuts made at the site of the bite. If the sure cure,

anti-venom, is available, time should not be wasted on mythical and outdated medical attempts.

(D) PATENT MEDICINES

Lexin, a gold chloride based inhalant and Tiriyaq, from Father Mueller's Clinic are two widely publicized snakebite medicines that have existed for over half a century. Several chemicals will neutralize venom in a test tube; but once injected into an animal or human, venom does not stay in the same place or same state and is difficult to neutralize. It is very natural that these sort of medicines became popular at a time when anti-venom serum had not yet reached rural India. Today, it must be considered criminal and dangerous to treat serious snakebite with anything but the approved serum, anti-venom.

(E) HERBS

Snake-charmers and others make a fair income through selling roots or powdered leaves against snakebite. The charmers are usually outright fakes who would dash to a hospital for anti-venom if bitten. However, partly effective snakebite herbs have been developed and experimented with (on themselves) by various tribal groups, the hunter-gatherers. The Irula snake-catchers of Tamil Nadu have many complex and specific herbal remedies for snakebite. The most consistent aspect of these treatments is the use of very bitter leaves and roots (high alkaloid content) of certain plants. If envenomated, the ordinarily bitter herbs are supposed to taste sweet to the victim. Dosages are repeated until the taste returns to normal. Almost every Irula carries his own little snakebite kit of herbs. Emergency measures for very serious bites include cutting open the scalp and rubbing in powdered herbs (vaccinations) or rolling them in a beedi (leaf cigarette) and smoking it for fast effect. Irulas also have a complete diet schedule and treatments for swelling, nausea, pain and other effects during and after recovery. These herbal remedies merit careful medical examination. The Irulas are perfectionists in their natural history knowledge and we strongly suspect that some very interesting findings could result from studies on their drugs.

SNAKEBITE STATISTICS

The actual figure of human deaths by snakebite in India is not known but may be estimated between 6,000 to 9,000 a year. This figure is high enough to justify perfecting anti-venom and advertising its use: still, this number is only about one-fifth of the deaths due to car accidents in America and about a third of the deaths due to dog-bite (rabies) in India.

The most recent study on snakebite was undertaken by Dr. Yoshio Sawai and Dr. M. Homma of Tokyo University in 1972. Dr. Sawai gives the following averages in a recent letter: According to Government Hospital statistics, 21,519 snakebite patients were treated in Indian hospitals in 1969 of which 1,091 died (5 per cent or 1 out of 20). These statistics unfortunately do not include private hospitals.

In Maharashtra, in 1969, there were a total of 1,093 deaths from snakebite. Of these, 993 occurred without hospitalization (91 per cent). In Kerala in the same year, there were 264 snakebite deaths but only 97 (37 per cent) in hospitals. Dr. Sawai goes on to say that if we estimate the total number of snakebite cases per year at 200,000 for all of India, it is suggested by statistics that about 10 per cent of the patients visit hospital and of these 0.5 per cent (1,000) die annually. On the other hand, 90 per cent of the snakebite victims receive 'treatment' with *mantra* and herbal remedies outside of hospital for a mortality of 9,000!

Dr. Sawai feels that the cobra is responsible for most deaths, the rapid onset of paralytic symptoms contributing to the high death-rate outside of hospital (i.e., before the patient from a rural area can reach a hospital). The krait is of secondary importance, but patient and doctor could rarely distinguish between the two (see *Symptoms*). The vipers are medically important in some areas, but the fatality rate is low. Most viperbite deaths occur in hospitals because uremic (kidney failure) symptoms appear a few days after the bite and patients have come to hospital late, i.e., after having tried all the other remedies. In only 6 per cent of the hospitalized cases was the responsible snake identified. If snakebite cases receive prompt anti-venom treatment, as mentioned before, deaths would be very few; it seems to be only a question of mass publicity and proper distribution of the anti-venom.

Bites from venomous snakes other than the Big Four are fortunately very rare. There is no anti-venom serum available for

these other snakes, although it is produced at the Queen Saovabha Institute, Bangkok, Thailand. There is evidently some use in giving Haffkine polyvalent anti-venom serum for banded krait and king cobra bites, but little point in using it in cases of pit viper and sea snakebites. These snakes are in any case rare, unwilling to bite or are not equipped with toxic enough venom to be dangerous to man.

The following are snakebite statistics from Government Hospitals in Uttar Pradesh, Tamil Nadu, and West Bengal in 1969 (Dr. Y. Sawai and Dr. M. Homma), and help emphasize how snakebite incidence can be minimized.

Body site of bite

Feet and lower leg: 72%
Hand and arm: 25%
Head and body: 3%
(including upper legs)

Times of bites:

Evening and after dark: 68%
Morning and afternoon: 32%

Snakebite in India is an occupational hazard mainly for the agricultural and other labourers. The peak danger period for these people is at monsoon time, when (a) snakes are more active, (b) grass and bushes are dense, and (c) field labour is at its maximum. A vigorous publicity and anti-venom distribution campaign could reduce India's snakebite deaths by at least 50 per cent.

Bengal has the highest number of reported snakebite deaths. If the country-wide trend holds true there (only 10 per cent of patients going to hospital), there may be as many as 3000 snakebite deaths in Bengal each year. Nadia District in Bengal has the highest frequency of bites of any district in the country both now and 100 years ago.

The following chart (pp. 104-5) illustrates the regional breakdown of snakebites in India. Keep in mind that these figures are reported statistics and that roughly 90 per cent of snakebite victims never come to a hospital.

State or Union Territory	Population	Snakebite patients in Government hospitals	Deaths
1. Andhra Pradesh	43,502,000	141	23
2. Assam	15,947,000	141	5
3. Bihar	56,353,000	872	21
4. Gujarat	26,697,000	2,274	62
5. Haryana	10,036,000	259	8
6. Himachal Pradesh	3,460,000	72	15
7. Jammu and Kashmir	4,616,000	832	33
8. Karnataka	29,299,000	682	36
9. Kerala	21,347,000	1,484	97
10. Madhya Pradesh	41,651,000	1,612	90
11. Maharashtra	50,412,000	992	100
12. Manipur	1,072,000	682	36
13. Meghalaya	1,011,000	9	0
14. Nagaland	516,000	64	1
15. Orissa	21,944,000	895	27
16. Punjab	13,551,000	196	16 ('67)
17. Rajasthan	25,765,000	1,426	62 ('68)
18. Uttar Pradesh	88,341,000	1,351	68
19. Tamil Nadu	41,199,000	968	31
20. Tripura	1,556,000	21	3 ('67)
21. West Bengal	44,312,000	7,835	384
22. Andaman and Nicobar Islands	115,000	171	3 ('70)
23. Arunachal Pradesh	467,000	90	0 ('67)
24. Chandigarh	257,000	28	4 ('68)
25. Dadra and Nagar Haveli	741,000
26. Delhi	4,065,000	195	4
27. Goa, Daman and Diu	857,000	195	4 ('67)
28. Lakshadweep Islands	31,000	0	0
29. Pondicherry	471,000	97	1
Total	23,584	1,134	

*From Yoshio Sawai and M. Homma's 'Snakebites in India', *The Snake*, Vol. 7. Publication of the Japan Snake Institute, 1975.

Checklist of the Snakes of India

INTRODUCTION

This is both a checklist and a classification of the Indian snakes; the snakes are listed in their evolutionary order according to M. A. Smith's *Fauna of British India*, Vol. III. There have been considerable changes in the zoological names of snakes since Smith's book was published. We have made an effort to revise the list through personal communications and from the works of A. S. Romer and Garth Underwood (see Bibliography).

With the complications of different Indian languages and regional names for snakes, we should try to use scientific names whenever possible. However, most people prefer using common, descriptive names. In order to begin getting a larger part of the population to understand snakes, we must have a standard list. We propose these common English names based on names used in literature when possible, otherwise basing names on characters, vernacular names, distribution or the person the snake was named after or described by.

The locality data is from G. A. Boulenger, F. Wall and M. A. Smith with some additions and revisions from a few more recent sources. There is plenty of work to be done; the very general nature of the locality data is unavoidable because of our serious lack of information about Indian snake distribution. Readers could help very much by sending live and preserved specimens, shedded skins and photographs with exact location and date to the Madras Snake Park, Madras 600 022.

'Throughout' India does not necessarily mean the snake is common, only that it is widely distributed.

CHECKLIST OF THE SNAKES OF INDIA

ORDER	INFRA ORDER	SCOLECOPHIDIA	Scientific Name	English Name	Locality
FAMILY—TYPHLOPIDAE	SUBFAMILY—TYPHLOPINAE				
				Genus <i>Typhlina</i> (Worm Snakes, Blind Snakes)	
				Species:	
			1. <i>porrectus</i>	Slender Worm Snake	Throughout India
			2. <i>psammeces</i>	Gunther's Worm Snake	Eastern India
			3. <i>bramina</i>	Common Worm Snake	Throughout India
			4. <i>thurstoni</i>	Thurston's Worm Snake	Southwest India
			5. <i>jerdoni</i>	Jerdon's Worm Snake	Eastern Himalayas; Assam
			6. <i>tenuicollis</i>	Peter's Worm Snake	Eastern Himalayas; Assam
			7. <i>diardi</i>	Large Worm Snake	Assam
			8. <i>oatesi</i>	Oate's Worm Snake	Andaman Islands
			9. <i>bothriolynchus</i>	Assam Worm Snake	Assam
			10. <i>tindali</i>	Malabar Worm Snake	Southwestern Ghats
			11. <i>beddomei</i>	Beddome's Worm Snake	Hills of South India
			12. <i>oligolepis</i>	Wall's Worm Snake	Eastern Himalayas

13. *andamanensis* Andaman Worm Snake
14. *acutus* Beaked Worm Snake

Andaman Islands
Central India

FAMILY—UROPELTIDAE (Shieldtail snakes)

Genus *Melanophidium*

Species:

- 15. *punctatum* Pied-belly Shieldtail
- 16. *bilineatum* Yellow-striped Shieldtail
- 17. *wynaadense* Wynaad Shieldtail

Genus *Platyplectrurus*

Species:

- 18. *trilineatus* Black-lined Shieldtail
- 19. *madurensis* Madurai Shieldtail

Genus *Teretrurus*

Species:

- 20. *sanguineus* Western Shieldtail

Genus *Brachy ophidium*

- 21. *rhodogaster* Wall's Shieldtail

Genus *Plectrurus*

Species:

- 22. *perroteti* Perrotet's Shieldtail
- 23. *guentheri* Purple Shieldtail
- 24. *aureus* Golden Shieldtail
- 25. *canariensis* Kanara Shieldtail

Genus *Uropeltis*

Species:

- 26. *ellioti* Elliot's Shieldtail
- 27. *nitidus* Cochin Shieldtail
- 28. *ocellatus* Nilgiri Shieldtail
- 29. *dindigulensis* Dindigul Shieldtail
- 30. *beddomii* Beddom's Shieldtail
- 31. *macrorhynchus* Anaimalai Shieldtail
- 32. *woodmasoni* Black-bellied Shieldtail
- 33. *macrolepis macrolepis* Bombay Shieldtail
- 33a. *mi. mahabaleshwarensis* Mahabaleshwar Shieldtail

Andaman Worm Snake
Beaked Worm Snake

Andaman Islands
Central India

Scientific Name	English Name	Locality
34. <i>ceylanicus</i>	Kerala Shieldtail	Goa to South Kerala; Shevaroys
35. <i>arcticeps</i>	Tirunelveli Shieldtail	South Kerala: Tirunelveli Hills
36. <i>rubromaculatus</i>	Red-spotted Shieldtail	Annamalai and Nilgiri Hills
37. <i>rubrolineatus</i>	Red-lined Shieldtail	Annamalai and South Kerala Hills
38. <i>myhendrae</i>	Barred Shieldtail	Nilgiris; South Kerala
39. <i>broughani</i>	Sirumalai Shieldtail	Paini and Sirumalai Hills
40. <i>maculatus</i>	Red-sided Shieldtail	Annamalai and South Kerala Hills
41. <i>petersi</i>	Peter's Shieldtail	Annamalai Hills
42. <i>liura</i>	Ashambu Shieldtail	Madurai and Tirunelveli Hills
43. <i>pulneyensis</i>	Pahni Shieldtail	Pahni and South Kerala Hills
44. <i>smithi</i>	Violet Shieldtail	Annamalai Hills

Genus *Rhinophis*

Species:

45. *sanguineus*
46. *fergusonianus*
47. *travancoricus*

FAMILY—XENOPELTIDAE

Genus *Xenopeltis*

Species:
45. *sanguineus*
46. *fergusonianus*
47. *travancoricus*

South Kanara District; Nilgiris; Tirunelveli

Cardamon Hills, Kerala

Kerala

Species:
48. *unicolor*

Sunbeam Snake

Andaman Islands

FAMILY—BOIDAE

SUBFAMILY—PYTHONINAE

Genus *Python*

Species:

49. *molurus*
50. *reticulatus*

SUBFAMILY—BOINAE

Genus *Eryx*

Sand Boas

Indian Python
Regal Python

Throughout India

Nicobar Islands

Species:

51. *conicus*
52. *johnii*

Throughout India (except Northeast)

Common Sand Boa
Red or Blunt-tailed Sand Boa

Throughout India (drier zones)

INFRA ORDER : CAENOPHIDIA

FAMILY—DIPSADIDAE

SUBFAMILY—PAREINAE

Scientific Name	English Name	Locality
Genus <i>Pareas</i>	Snail-eating Snakes	

Species:

- 53. *monticola* Assam Snail-eater Eastern Himalayas; Assam
- 54. *macularius* Darjeeling Snail-eater Darjeeling

SUBFAMILY—XENODERMATINAE

Genus *Stoliczkaia*

Species:

- 55. *khasiensis* Khasi Earth Snake Assam

SUBFAMILY—LYCODONTINAE

Genus *Lycodon*

Species:

- 56. *travancoricus* Travancore Wolf Snake Western Ghats; Andhra Pradesh
- 57. *jara* Yellow-speckled Wolf Snake Uttar Pradesh; Ganjam; Eastern Himalayas; Assam

58. *striatus* Barred Wolf Snake Throughout India

59. *flavonigricollis* Yellow-spotted Wolf Snake Northwestern Ghats

60. *mackinnoni* Mackinnon's Wolf Snake Western Himalayas

61. *australis* Common Wolf Snake Throughout India

62. *fasciatus* Banded Wolf Snake Eastern Himalayas; Assam

63. *invari* Tiwari's Wolf Snake Andaman and Nicobar Islands

Genus *Oligodon*

Species:

- 64. *cyclurus* Cantor's Kukri Snake Bengal; Assam
- 65. *juglandifer* Darjeeling Kukri Snake Darjeeling
- 66. *albocinctus* White-barred Kukri Snake Eastern Himalayas; Assam
- 67. *melazonotus* Wall's Kukri Snake Assam
- 68. *woodmasoni* Yellow-striped Kukri Snake Andaman and Nicobar Islands
- 69. *cineraceus* Black-barred Kukri Snake Assam
- 70. *taeniatus* Russell's Kukri Snake Throughout India
- 71. *theobaldi* Mandalay Kukri Snake Assam
- 72. *venustus* Black-spotted Kukri Snake Western Ghats south of Goa
- 73. *travancoricus* Travancore Kukri Snake Western Ghats south of Palghat
- 74. *arnensis* Common Kukri Snake Throughout India
- 75. *erythrorachis* Red-striped Kukri Snake Assam
- 76. *melaneus* Black Kukri Snake Darjeeling
- 77. *brevicauda* Striped Kukri Snake Western Ghats south of Goa

Scientific Name	English Name	Locality
78. <i>dorsalis</i>	Spot-tailed Kukri Snake	Eastern Himalayas
79. <i>erythrogaster</i>	Red-bellied Kukri Snake	Eastern Himalayas
80. <i>affinis</i>	Western Kukri Snake	Western Ghats south of Goa

Genus *Calanaria*

Species:
81. *pavimentata* False Wolf Snake Assam

Genus *Dinodon*

Species:
82. *septentrionalis* Gunther's False Wolf Snake Eastern Himalayas; Assam
83. *gammieei* Sikkim False Wolf Snake Sikkim; Darjeeling

Genus *Dryocalamus*

Species:
84. *nympha* Common Bridal Snake South India and east coast of Orissa
85. *gracilis* Gunther's Bridal Snake Western Ghats; Orissa

Genus *Trachischium*

Species:
86. *monticola* Assam Oriental Worm Snake Assam
87. *fuscum* Darjeeling Oriental Worm Snake Eastern Himalayas
88. *guentheri* Gunther's Oriental Worm Snake Sikkim; Darjeeling
89. *tenuiceps* Orange-belted Oriental Worm Snake Eastern Himalayas
90. *laeve* Olive Oriental Worm Snake Western Himalayas

Genus *Rhabdops* Forest Snakes

Species:
91. *olivaceus* Olive Forest Snake Western Ghats (Wynaad)
92. *bicolor* Yellow-bellied Forest Snake Khasi and Mishmi Hills, Assam

Genus *Blythia*

Species:
93. *reticulata* Iridescent Snake Assam

Scientific Name	English Name	Locality
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Genus *Xylophis*

Species:

- 94. *perroteti* Striped Small-headed Snake Southwestern Ghats
- 95. *sterorhynchus* Gunther's Small-headed Snake Southwestern Ghats

SUBFAMILY—SIBYNOPHINAE

Genus *Sibynophis*

Black-headed Snakes

Species:

- 96. *collaris* Collared Black-headed Snake Eastern Himalayas
- 97. *subpunctatus* Duméril's Black-headed Snake Southwest, Central and Northeast India
- 98. *bistrigatus* Nicobar Black-headed Snake Camorta (Nicobar Islands)
- 99. *sagittarius* Cantor's Black-headed Snake Western Himalayas; Central and Northeast India

FAMILY—NATRICIDAE

Genus *Natrix**Species:*

- 100. *nicobarensis* Nicobar Watersnake
- 101. *peali* Peal's Watersnake

Genus *Amphiesma**Species:*

- 102. *stolata* Striped Keelback
- 103. *beddomei* *Beddome's Keelback*
- 104. *parallelia* Boulenger's Keelback
- 105. *khasiensis* Khasi Keelback
- 106. *platiceps* Mountain Keelback
- 107. *modesta* Gunther's Keelback
- 108. *xenura* Cherrapunji Keelback
- 109. *monticola* Green Western Keelback

Genus *Rhabdophis**Species:*

- 110. *subminiata* Red-necked Keelback
- 111. *himalayana* Himalayan Keelback

Species:

- Camorta (Nicobar Islands)
- Assam
- Throughout India
- Western Ghats
- Sikkim; Assam
- Assam
- Himalayas; Assam
- Assam
- Assam
- Western Ghats south of Goa

- Eastern Himalayas
- Eastern Himalayas; Assam

Scientific Name	English Name	Locality
Genus <i>Pseudoxenodon</i>		
<i>Species:</i>		
112. <i>macrops</i>	False Cobra	Eastern Himalayas
Genus <i>Macropisthodon</i>		
<i>Species:</i>		
113. <i>plumbicolor</i>	Green Keelback	Throughout India
Genus <i>Xenochnophis</i>		
<i>Species:</i>		
114. <i>piscator</i>	Checkered Keelback snake	Throughout India
115. <i>ceratogaster</i>	Dark-bellied Marsh Snake	Uttar Pradesh; Bengal; Assam
Genus <i>Atretium</i>		
<i>Species:</i>		
116. <i>schistosum</i>	Olive Keelback Water snake	Throughout India except Himalayas

FAMILY—ACROCHORDIDAE

Genus *Acrochordus*

Species:	English Name	Locality
117. <i>granulatus</i>	File Snake	West Coast; Northeast Coast; Nicobar Islands

FAMILY—COLUBRIDAE

SUBFAMILY—COLUBRINAE

Genus *Elaphe*

<i>Species:</i>	Green Trinket Snake	Eastern Himalayas; Assam; Andaman Islands
118. <i>prasina</i>	Assam Trinket Snake	Assam
119. <i>frenata</i>	Copperhead Trinket Snake	Orissa; Eastern Himalayas
120. <i>radiata</i>	Common Trinket Snake	Throughout India
121. <i>helena</i>	Striped Trinket Snake	Darjeeling
122. <i>taeniura</i>	Himalayan Trinket Snake	Himalayas from Kashmir to Sikkim; Assam
123. <i>hodgsoni</i>	Eastern Trinket Snake	Eastern Himalayas
124. <i>cantorii</i>	Yellow-striped Trinket Snake	Andaman Islands
125. <i>flavolineata</i>	Black-banded Trinket Snake	Eastern Himalayas; Assam
126. <i>porphyraea</i>		

Scientific Name	English Name	Locality
Genus <i>Gonyosoma</i>		
<i>Species:</i>		
127. <i>oxycephalum</i>	Red-tailed Trinket Snake	Andaman and Nicobar Islands
Genus <i>Ptyas</i>		
<i>Species:</i>		
128. <i>mucosus</i>	Rat Snake or Dhaman	Throughout India
Genus <i>Zaocys</i>		
<i>Species:</i>		
129. <i>nigromarginatus</i>	Green Rat Snake	Eastern Himalayas
Genus <i>Argyrogena</i>		
<i>Species:</i>		
130. <i>ventromaculatus</i>	Glossy-bellied Racer	Western Himalayas; Plains of Northwest India
131. <i>fasciolatus</i>	Banded Racer	Throughout India except Northwest
132. <i>gracilis</i>	Gunther's Racer	Maharashtra; Madhya Pradesh

Genus *Spalerosophis*

<i>Species:</i>		
133. <i>diadema</i>	Royal Snake	Northwest India (Uttar Pradesh, Rajasthan, Punjab)
134. <i>arenarius</i>	Red-spotted Snake	Rajasthan.

Genus *Ophiodrys*

<i>Species:</i>		
135. <i>doriae</i>	Green Snake	Manipur
Genus <i>Liopeplus</i>		
<i>Species:</i>		
136. <i>frenatus</i>	Striped-neck Snake	Assam
137. <i>stoliczkae</i>	Stoliczka's Striped-neck Snake	Sikkim; Darjeeling; Assam
138. <i>calamaria</i>	Lesser Striped-neck Snake	Hilly areas throughout India except extreme Northwest
139. <i>nicobariensis</i>	Nicobar Striped-neck Snake	Camorta (Nicobar Islands)
140. <i>rappi</i>	Himalayan Striped-neck Snake	Himalayas

Scientific Name **English Name** **Locality**

Genus Coronella

Species:

141. *brachyura*

Smooth Snake

Northern Maharashtra

Genus Dendrelaphis

Species:

142. *pictus*

Painted Bronzeback Snake

Throughout India

143. *cymochloris*

Green Bronzeback Tree Snake

Darjeeling; Assam; Andaman and Nicobar Islands

144. *grandoculis*

Large-eyed Brown Tree Snake

Southwestern Ghats

145. *gorei*

Himalayan Bronzeback Tree Snake

Eastern Himalayas; Assam

146. *bifrenalis*

Boulenger's Bronzeback Tree Snake

Western India

147. *caudolineata*

Stripe-tailed Bronzeback Tree Snake

South Kerala; Ramanathapuram District, Tamil Nadu

148. *risiis*

Common Bronzeback Tree Snake

Throughout India

6

Genus Chrysopelea

Species:

149. *ornata*

Ornate Flying Snake

Western Ghats south of Goa; Orissa; Bengal; Assam; Bihar; Tripura

150. *paradisi*

Paradise Flying Snake

Narcondam, Andaman Islands

Genus Psammophis

Species:

151. *schokari*

Desert Sand Snake

Rajasthan; Punjab; Kashmir

152. *condanarus*

Himalayan Sand Snake

Western Himalayas and North-central India

153. *longifrons*

Stout Sand Snake

Maharashtra

154. *leithi*

Leith's Sand Snake

Western India, Poona to Kashmir

Genus Psammodynastes

Species:

155. *pulverulentus*

Mock Viper

Eastern Himalayas

Genus Ahaetulla

Species:

156. *perroteti*

Bronze-headed Vine Snake

Southwestern Ghats

Scientific Name	English Name	Locality
157. <i>dispar</i>	Gunther's Vine Snake	Southwestern Ghats
158. <i>fronticinctus</i>	River Vine Snake	Darjeeling; Assam
159. <i>prasinus</i>	Short-nosed Vine Snake	Eastern Himalayas
160. <i>nasutus</i>	Common Vine Snake	Throughout India except the Northwest
161. <i>pulverulentus</i>	Brown Vine Snake	Southwestern Ghats

FAMILY—HOMALOPSIDAE

SUBFAMILY—BOGINAE

Genus *Boiga*

Cat Snakes

Species:		
162. <i>multimaculata</i>	Large-spotted Cat Snake	Assam
163. <i>ochracea</i>	Tawny Cat Snake	Eastern Himalayas; Assam; Andaman and Nicobar Islands
164. <i>trigonata</i>	Common Cat Snake	Throughout India
165. <i>gokool</i>	Eastern Cat Snake	Eastern Himalayas; Assam
166. <i>guincuniata</i>	Assam Cat Snake	Assam
167. <i>ceylonensis</i>	Ceylon Cat Snake	Western Ghats; Orissa; Assam; Nepal; Andaman Islands
168. <i>multifasciata</i>	Himalayan Cat Snake	Himalayas

169. <i>cynodon</i>	Bengal Cat Snake	North Bengal, Assam
170. <i>dighoni</i>	Travancore Cat Snake	Kerala
171. <i>forsteni</i>	Forsten's Cat Snake	Western Ghats; Northeast India
172. <i>cyanea</i>	Green Cat Snake	Darjeeling; Assam

SUBFAMILY—HOMALOPSINAE

Genus *Enhydris*

173. <i>enhydris</i>	Common Smooth Water Snake	Northeast India
174. <i>dussumieri</i>	Dussumier's Smooth Water Snake	Bengal; Kerala coast
175. <i>sieboldi</i>	Siebold's Smooth Water Snake	Throughout India except dry zones

Genus *Cerberus*

176. <i>rhynchos</i>	Dog-faced Water Snake	Throughout coastal India; Andaman and Nicobar Islands

Genus *Gerarda*

177. <i>prevostiana</i>	Glossy Marsh Snake	Coastal India

Scientific Name	English Name	Locality
Genus <i>Foronia</i>		
Species:		
178. <i>leucobalia</i>	White-bellied Mangrove Snake	Sunderbans; Nicobar Islands
Genus <i>Canthoria</i>		
Species:		
179. <i>violacea</i>	Yellow-banded Mangrove Snake	Andaman Islands
SUBFAMILY—DASYPeltinae		
Genus <i>Elachistodon</i>		
Species:		
180. <i>westernnami</i>	Indian Egg-eater	North Bengal; Bihar
FAMILY—ELAPHIDAE		
SUBFAMILY—ELAPINAE		
Genus <i>Bungarus</i>	Kraits	
Species:		
181. <i>walli</i>	Wall's Krait	Uttar Pradesh; Bengal; Bihar; Orissa
182. <i>bungaroides</i>	Himalayan Krait	Eastern Himalayas; Assam
183. <i>lividus</i>	Lesser Black Krait	North Bengal; Assam
184. <i>niger</i>	Black Krait	Eastern Himalayas; Assam
185. <i>caeruleus</i>	Common Krait	Throughout India; Andaman and Nicobar Islands
186. <i>fuscatus</i>	Banded Krait	Orissa; Bihar; Bengal Assam
187. <i>multicinctus</i>	Many Banded Krait	Andaman and Nicobar Islands
Genus <i>Callophis</i>	Coral Snakes	
Species:		
188. <i>melanurus</i>	Slender Coral Snake	Throughout India (except Northwest)
189. <i>nigrescens</i>	Striped Coral Snake	Southwestern India
190. <i>beddomei</i>	Beddome's Coral Snake	Southwestern India
191. <i>macclellandi</i>	MacClelland's Coral Snake	Eastern Himalayas; Assam
192. <i>bibroni</i>	Bibron's Coral Snake	Southwestern Ghats

Scientific Name	English Name	Locality
Genus <i>Naja</i>	Cobras	
<i>Species and sub-species:</i>		
193. <i>naja naja</i>	Binocellate or Spectacled or Throughout India	
	Common Cobra	
193a. <i>naja kaouthia</i>	Monocellate, Monocled or Bengal; Assam; Andaman Islands	
	Bengal Cobra	
193b. <i>naja oxiana</i>	Black Cobra Northwest India	
Genus <i>Ophiophagus</i>		
<i>Species:</i>		
194. <i>hannah</i>	King Cobra	Western Ghats south of Goa; Himalayas; Orissa; Bengal: Andaman Islands
SUBFAMILY—HYDROPHINAE	Sea Snakes	
Genus <i>Laticauda</i>		
<i>Species:</i>		
195. <i>laticauda</i>	Common Amphibious Sea Snake	Bay of Bengal; Nicobar Islands
196. <i>colubrina</i>	Colubrine Amphibious Sea Snake	Bay of Bengal; Andaman and Nicobar Islands
Genus <i>praescutata</i>		
<i>Species:</i>		
197. <i>viperina</i>	Viperine Sea Snake	Indian Ocean; Bay of Bengal
Genus <i>Kerilia</i>		
<i>Species:</i>		
198. <i>jerdoni</i>	Jerdon's Sea Snake	Bay of Bengal
Genus <i>Enhydrina</i>		
<i>Species:</i>		
199. <i>schistosa</i>	Hook-nosed Sea Snake	Bay of Bengal; Indian Ocean
Genus <i>Hydrophis</i>		
<i>Species:</i>		
200. <i>nigroinctus</i>	Black-banded Sea Snake	Bay of Bengal
201. <i>spiralis</i>	Yellow Sea Snake	Indian Ocean; Bay of Bengal
202. <i>obscurus</i>	Estuarine Sea Snake	Bay of Bengal; Chilka Lake
203. <i>cyanocinctus</i>	Annulated Sea Snake	Indian Ocean; Bay of Bengal

Scientific Name	English Name	Locality
204. <i>stricticollis</i>	Bengal Sea Snake	Bay of Bengal
205. <i>ornatus</i>	Cochin Banded Sea Snake	Indian Ocean; Bay of Bengal
206. <i>lapemoides</i>	Persian Gulf Sea Snake	Indian Ocean; Bay of Bengal
207. <i>mammillaris</i>	Bombay Sea Snake	Indian Ocean; Bay of Bengal
208. <i>caeruleescens</i>	Malacca Sea Snake	Indian Ocean; Bay of Bengal
209. <i>fasciatus</i>	Banded Sea Snake	Indian Ocean; Bay of Bengal

Genus *Lapemis*

Species:
210. *curtus*

Malabar Sea Snake

Indian Ocean; Bay of Bengal

Genus *Astrotaia*

Species:

211. *stokesi*

Large-headed Sea Snake

Bay of Bengal

Genus *Microcephalophis*

Species:

212. *gracilis*

Common-Narrow-headed Sea Snake

Indian Ocean; Bay of Bengal

213. *cantorii*

Cantor's Narrow-headed Sea Snake

Indian Ocean; Bay of Bengal

Genus *Pelamis*

Species:

214. *platurus*

Yellow and Black Sea Snake

Indian Ocean; Bay of Bengal

FAMILY—VIPERIDAE

SUBFAMILY—VIPERINAE

Genus *Vipera*

Species:

215. *russelli*

Russells Viper
Levantine Viper

Kashmir

Genus *Echis*

Species:

217. *carinatus*

Saw-Scaled Viper

Throughout India (generally dry zones)

Scientific Name	English Name	Locality
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SUBFAMILY—CROTALINAE

Genus *Agkistrodon**Species:*

218. *himalayanus*
219. *hypnale*

Genus *Trimeresurus**Species:*

220. *macrolepis*
221. *malabaricus*
222. *strigatus*
223. *gramineus*
224. *mucrosquamatus*
225. *monticola*
226. *jerdoni*
227. *stejnegeri*
228. *popeorum*

229. *cantori*
230. *pureomaculatus andersoni*
231. *erythhrurus*
232. *albolabris*
233. *labilis*

Himalayan Pit Viper
Hump-nosed Pit Viper

Western Himalayas
Southwestern Ghats

Large-scaled Green Pit Viper
Malabar Rock Pit Viper
Horse-shoe Pit Viper
Bamboo Pit Viper

Southwestern Ghats
Southwestern Ghats
Southwestern Ghats
Northwestern Ghats; Hills of Central and
Eastern India

Brown Spotted Pit Viper
Blotched Pit Viper
Jerdon's Pit Viper
Stejneger's Pit Viper
Pope's Green Pit Viper

Southwestern Ghats
Southwestern Ghats
Southwestern Ghats
Northwestern Ghats; Hills of Central and
Eastern India

Assam
Eastern Himalayas; Assam
Eastern Himalayas; Assam
Eastern Himalayas; Assam
Eastern Himalayas; Assam

Cantor's Pit Viper
Andaman Pit Viper
Spot-tailed Pit Viper
Green Pit Viper
Nicobar Pit Viper

Nicobar Islands
Andaman and Nicobar Islands
Eastern Himalayas; Assam
Himalayas; Andaman and Nicobar Islands
Nicobar Islands

It is difficult to narrow down the choice of names of snakes in Indian languages. There are generally several names for each of the most common or most venomous snakes and no names for the lesser-known ones. The tendency is to call any snake by the name of the familiar one it most resembles. Therefore, any banded snake is Kattu Viriyan (Krait) in Tamil and in many places almost every snake is called the local version of 'cobra'. The following list is a start at standardizing local snake names and readers would help a great deal by sending their local snake names to the Madras Snake Park for compilation. Lack of information from other areas prevents us from including more vernacular names. It would only be more confusing to list unconfirmed common names.

English	Hindi	Tamil	Bengali	Oriya
1. Worm Snake	Andha Samp	Seer Pambu	Puiyen	Telia Sapa
2. Shieldtail Snake	Ajgar	Mann Pambu	Moyal	Ajagara, Budha Sapa, Boda Sapa
3. Python		Malai Pambu or Dasari Pambu	Bali Borha	
4. Common Sand Boa	Mati Ka Samp	Mann Pambu or Podeyan		Domundia
5. Red Sand Boa	Do Mu Samp	Sowp Mun Pambu		Boda, Jatia Sapa
6. Wolf Snake	Sankhara	Nai Pambu or Veedu Pambu		
7. Kukri Snake	Kukri Samp	Yennai Panian	Udoy kal Hele	Kauchia, Bramhuni, Matibiradi, Matibrada.
8. Striped Keelback	Hurwa	Nikitan Kuttii or Pul-eri Pambu	Metuli	
9. Green Keelback	Hara Nag	Pachai 'Nagam'	Jol Dhnorha	Dhanda, Panidhanda
10. Checkered Keelback Watersnake	Pani ka Samp	Thanni Pambu		
11. Olive Keelback Watersnake	Hara Pani ka Samp	Pachai Thanni Pambu		
12. Trinket Snake	Dhaman	Micro Pambu		
13. Rat Snake		Sarai Pambu	Dhanaras	
14. Banded Racer		Wohdu-kali Pambu		
15. Royal Snake	Rajat bansi	Komberi Mukkan or Baetachhra		
16. Bronzeback Tree Snake	Lal-dhaman or Jard Ka Dhaman	Marram-eri Pambu		
17. Flying Snake		Parakum Pambu	Kal Nagini	
18. Vine or Green Snake	Hara Samp	Pachai Pambu	Laudoga	Laudanka, Laudankia
19. Cat Snake		Poonai Pambu or Wollai Pambu	Banka Raj	Dalua Naga
20. Dog-faced Water-snake		Uppu-Ar Pambu		
21. Common Krait	Maneer or Karait	Kattu Viriyan or Karuvelan Pambu	Kalaj, Domna Chitti	

English	Hindi	Tamil	Bengali	Orissa
22. Banded Krait	Gaoman (Bihar)	Pattai Kattu Viriyan	Shankhini	Rana
23. Coral Snake		Nalla Pambu or Naga Pambu	Gokhro	Gokhara, Gokhura
24. Cobra (spectacled)	Nag Samp	Nalla Pambu or Naga Pambu	Keoute	Tampa
25. Cobra (monocled)	Nag Samp	Naga Pambu or Raja Nagam or Karru Nagam or Kadal Pambu	Sankhachoor	Ahiraja, Sankhachuda Manichuda
26. King Cobra	Naga Raja	Raja Nagam or Karru Nagam or Kadal Pambu		
27. Sea Snake	Dariya Samp or Samudhra Samp	Kannadi Viriyan	Chandra Borha	Chandra Bora,
28. Russells Viper	Gonus	Surutai Pambu Kuzhi Viriyan or Chetta-thalai Pambu	Gechho Borha	Chandramuthia Boda Dhuli Naga Katakatia Naga (bamboo pit viper)
29. Saw-scaled Viper	Phoorsa			
30. Pit Viper	Hara Gonus			

Rainfall Chart

Average rainfall in India over the last 25 years (in millimeters)

Place	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Madurai	31	14	21	58	67	37	49	111	122	184	150	50	894
Kodaikanal	82	39	51	124	156	108	117	177	177	256	253	129	1669
Coimbatore	18	8	11	43	63	36	47	33	41	161	113	38	612
Ootacamund	35	12	32	85	158	156	201	147	138	202	157	48	1371
Palghat	11	11	23	60	132	428	605	334	155	209	116	300	2384
Mangalore	5	2	9	35	177	966	1019	607	272	208	79	15	2394
Munnar	18	21	36	122	279	782	1122	705	41	248	137	40	3551
Hyderabad	8	11	12	26	29	107	161	135	171	73	31	5	769
Bombay	4	2	1	1	18	465	613	328	286	64	17	2	1801
Mahabaleshwar	5	3	5	25	47	939	2546	1764	686	154	47	5	6226
Nagpur	11	23	16	16	21	222	376	286	185	55	20	10	1241
Ajmer	9	7	6	7	15	59	159	168	73	9	3	5	520
Delhi	21	23	12	9	9	67	186	169	134	14	2	8	654
Simla	65	70	64	46	58	149	416	419	182	33	10	27	1539
Srinagar	70	73	94	90	59	34	56	62	39	27	12	37	653
Darjeeling	11	32	54	113	231	597	792	643	445	142	25	6	3091

Place	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Patna	15	22	9	8	30	158	276	340	237	54	8	5	1162
Calcutta	11	28	32	50	117	284	323	314	230	123*	17	3	1532
Naga Hills	31	83	115	265	462	529	609	500	411	177	37	17	3236
Cherrapunji	18	48	195	665	1240	2640	2361	1799	1104	486	69	102	10727
Puri	12	22	11	16	63	186	281	268	227	192	80	9	1367
Madras	24	7	15	25	51	53	84	124	118	267	308	139	1215
Bangalore	7	9	10	44	107	71	111	136	163	153	61	13	885
Trivandrum	23	21	37	106	208	356	223	145	138	273	205	75	1810
Middle Andaman Island	50.4	25.6	12.9	90	416	490.3	514.9	443.3	491.5	316.8	218.3	161	3231

Identification of Snakes

Snakes vary in colour and pattern; young snakes are sometimes differently marked than adults, harmless snakes resemble venomous kinds and vice versa. For the more practised naturalist, a key to the common Indian species calls for the closest examination and counting of scales. The diagrams describe the scales and characters referred to in the key. It is hoped that many more people will be encouraged to become familiar with the use of this form of positive identification.

METHOD: Carefully examining a dead snake, compare with the key, proceeding to the number which describes the snake's main characters.

1. Tail round or nearly so; wide scales of underside or ventrals (ventral scutes) large in most species, absent in some.....2
- Tail very flat; ventral scutes small or absent on posterior half of body
- Tail very flat; ventral scutes large.....41
2. Ventral scutes wide; eyes exposed and well developed; size variable
- Ventral scutes absent; eyes underdeveloped, covered by shields; very small and worm-like
3. Ventral scutes usually extending full width of underside; dorsal scale rows 35 or fewer
- Ventral scutes not extending full width of underside; dorsal scale rows 39 or more
4. Top of head with small scales irregularly arranged; large fangs in front and folding against roof of mouth
- Head widely triangular; deep sensory pit located between nostril and eye..... Pit Vipers of genus *Trime resurus*
- Top of head with plates; otherwise same; including loreal pit..... Pit Vipers of genus *Agkistrodon*

Top of the head with large plates; frontal fangs if present small and fixed..... 6

5. Side scale rows smaller and more slanting than dorsal; central row of light blotches and wavy light side stripes.... Saw-scaled Viper

Scale rows regular; three rows of dark spots on lighter ground colour..... Russells Viper

6. Fangs in front; loreal shield absent..... 7

No fangs; loreal shield usually present..... 8

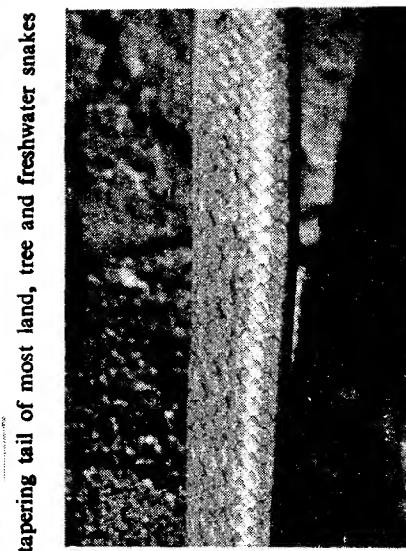
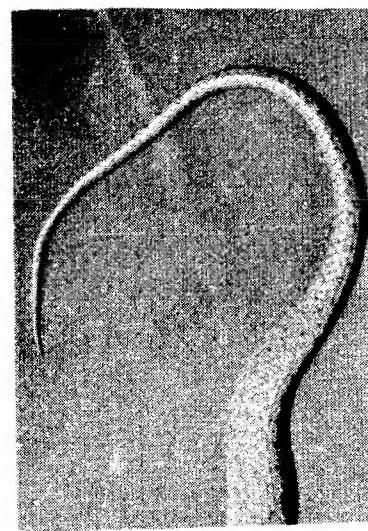
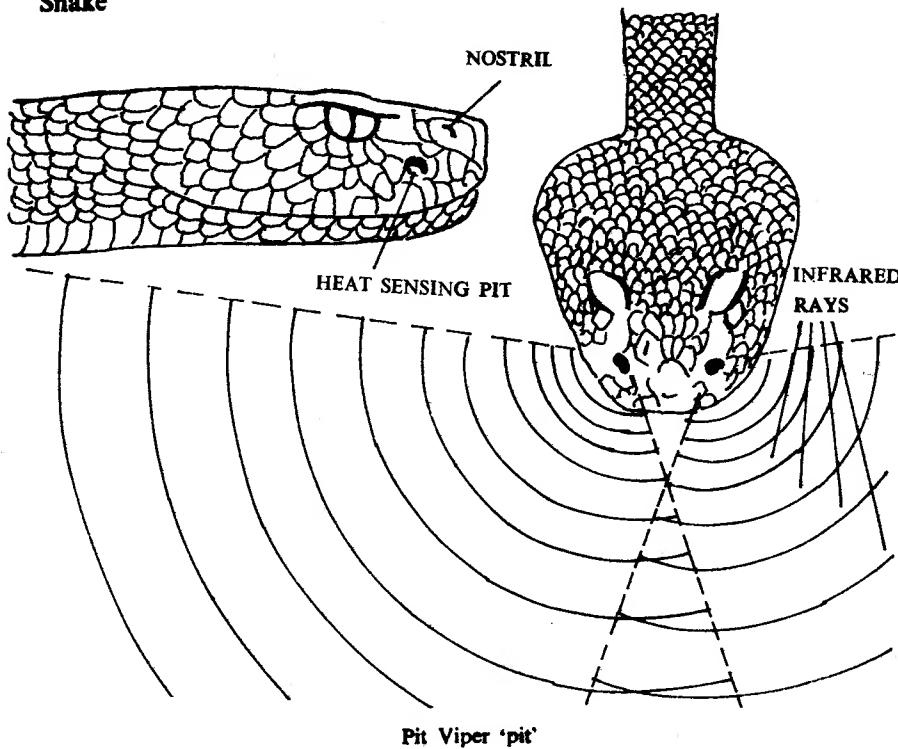
7. Hood seen in life; third upper labial touching nasal; vertebral scale row not enlarged; subcaudals divided Cobra

No hood; third upper labial not touching nasal; vertebral scale row distinctly enlarged; subcaudals undivided.... Common Krait

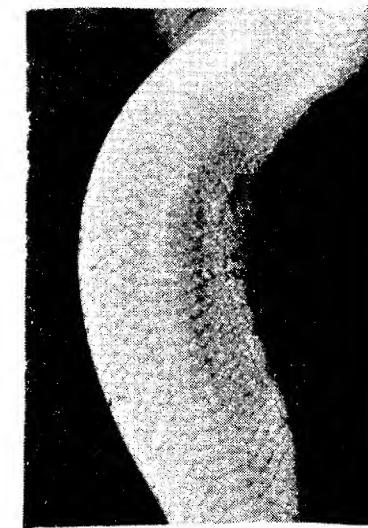
8. Nostrils on upper surface of snout, valve-like; ventrals reduced in size 9

Nostrils on the side or nearly so, no valves; ventrals large 10

9. Scales smooth; pattern of stripes on underside...Smooth Water Snake



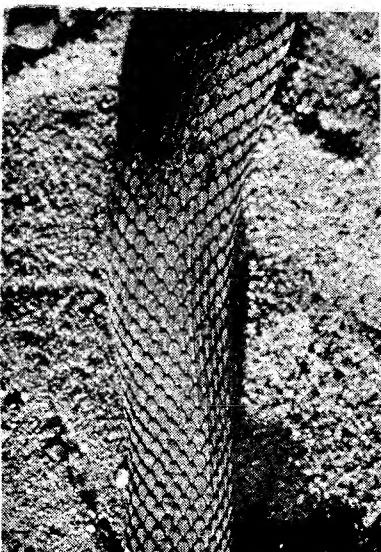
Long, tapering tail of most land, tree and freshwater snakes



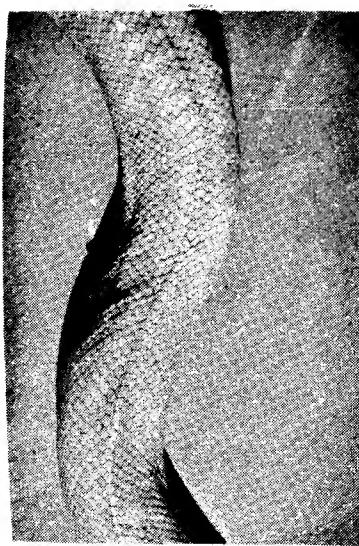
Small belly scales of burrowing snake

Smooth, glossy, scales of the Rat Snake

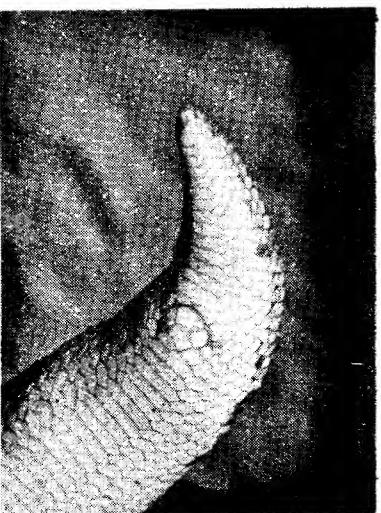
Broad belly scales of all tree, land and freshwater snakes



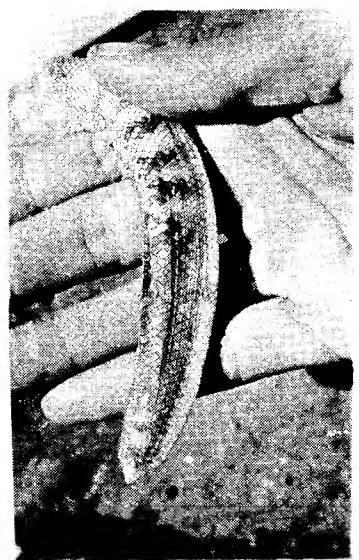
Rough, keeled scales of the Dog-faced Water Snake



Sea snake ventral scales



Short, blunt tail of a burrowing snake, the Common Sand Boa



Sea snake tail

Scales keeled; pattern of dark spots or cross bars Dog-faced Water Snake

10. Dorsal scales smooth throughout 11

At least some of the dorsal scales keeled 26

11. Eye very dark, pupil barely visible, black or dark brown, with white to pale yellow markings 12

12. Ventrals angular at each end; nine upper labials Common Wolf Snake

Ventrals not angular; eight upper labials Barred Wolf Snake

13. Ventrals notched and with keel on sides with wide dark dorsal stripe Bronzeback Tree Snake

Ventrals similar, body brightly spotted Flying Snake

Ventrals not as above 14

14. Eye with elliptical pupil; head much wider than neck 15

15. Head with light inverted Y-mark; side scale rows strongly slanting Cat Snake

16. Head and nape black or with distinctive dark markings; adult length less than 70 cm; subcaudals fewer than 60; 15 scale rows at midbody Russells Kukri Snake

Dark chevrons on head and nape; 17 scale rows at midbody Banded Kukri Snake

17. Scale rows at midbody 19 to 23; ventrals 195 or more 18

18. Dark with light cross bands (may be absent); 21 or 23 scale rows 19

Light with dark markings often fading out on tail; 19 scale rows 20

19. Fewer than 100 subcaudals; eight supralabials Banded Racer

20. Pattern of dark cross bars or rhombs; short vertebral dark stripe; scale rows just ahead of vent 13 to 15 Glossy Bellied Racer

21. Labials separated from eye by suboculars; temporals small and irregular in arrangement; rostral broader than high; pattern extremely variable Royal Snake

22. Anal undivided; ventrals 217 or more Trinket Snake

Anal divided; ventrals fewer than 215 23

23. Scale rows at midbody 23-27; seven upper labials Green Keelback

Scale rows 19; eight or nine upper labials 24

24. Ventrals 190 or more; adult length over 195 cm.....

..... Rat Snake
 25. Ventrals fewer than 160; maximum length less than 1.25 metres dorsal pattern of alternating spots..... Checkered Keelback Water Snake
 Dorsal pattern with light stripes Striped Keelback
 26. Pattern of regular, large brown saddles; front supralabials with sensory pits; adult length, 2 metres or more.... Indian Python
 Pattern similar to above; no supralabial pits; ventrals less than 200; length not exceeding 1.5 metres..... 27
 27. Pattern of irregular dark blotches often partly fused; rough tail tapering abruptly..... Common Sand Boa
 One coloured or with widely separated bands; and of tail very blunt, often as wide as head..... Red Sand Boa
 28. Colour dark brown to almost black; scale rows 18; diameter of body 50 times into total length; belly scales not visible..... Slender Blind Snake
 Scale rows 20; diameter of body not more than 50 times into total length..... Common Blind Snake. Colour variable; scale rows 15, 17; underside generally brightly marked; belly scales small but visible any of the Shield tail Snakes
 29. Mental shield long and concealed in cleft; tip of rostral decurved and pointed Hook-nosed Sea-Snake
 Mental and rostral not as above 30
 30. Ventrals at midbody small but definitely larger than adjacent scales 31
 Ventrals at midbody absent or no larger than adjacent scales ..38
 31. Ventrals of almost uniform size 32
 Ventrals larger toward the front of the snake..... 37
 32. Head very small and neck slender; ventrals more than 400..
 Head and neck not as above; fewer than 400 ventrals 33
 33. Scales on thickest part of body with rounded or bluntly pointed tips: distinctly or slightly overlapping; eight or fewer maxillary teeth 34
 Scales on thickest part of body hexagonal or square slightly overlapping or placed side by side; eight or more maxillary teeth.... 35
 34. One anterior temporal; dark rings much narrower than interspaces Yellow Sea Snake
 Two anterior temporals; dark rings about as wide as interspaces.... Ringed Sea Snake

35. Top of head with curved yellow mark more distinct in young; pattern of cross bands, black in young, greenish in adults; ventrals 314-372 Persian Gulf Sea Snake
 Top of head without markings; pattern blackish cross bands or rhombs 36
 36. Top of head olive; 30 or more scale rows on neck; ventrals 302-390 Bombay Sea Snake
 37 Ventrals 225 or more; anterior ones half of the width of the body Viperine Sea Snake
 Ventrals fewer than 200, anterior ones not half of the width of the body Malabar Sea Snake
 38. Dorsal scales pointed and overlapping; head large and body very stout Large-headed Sea Snake
 Dorsal scales side by side; habitat not as above..... 39
 39. Head long and flat; neck short; body strongly flattened laterally Long-nosed Sea snake
 Head small; neck long and slender; body subcylindrical 40
 40. Ventrals fewer than 350....Common Small-headed Sea Snake
 41. Sea snakes with large ventrals would be one of the two
 Amphibious Sea Snakes (*Laticauda*)

Adapted from Dr. S. A. Minton's
 'An Annotated Key to the Amphibians
 and Reptiles of Sind and Las Bela'.

Identification of the living snake in the field is usually made on the basis of colour, pattern, habitat and behaviour. This requires practice and experience; the clues used do not lend themselves well to brief verbal description. A 'venomous vs. harmless' identification of a dead or captive snake is easy, especially if the specimen is fresh and not badly mutilated. The steps in identification listed (with the help of the illustrations) can be followed by any person with a minimal knowledge of a snake's anatomy. Do not handle a living unknown snake. Until one is familiar with common snakes, positive identification can be done on dead specimens which should be preserved in formalin.

1. If the snake has a very flattened paddle-like tail and the ventral scutes are very small or absent, it is a sea snake and very

venomous. (Amphibious Sea Snakes, *Laticauda*, have fairly wide, well-developed scutes.) Of the local species, the Hook-nosed Sea Snake, Yellow Sea Snake, Ringed Sea Snake, Cochin Banded Sea Snake, Common Narrow-headed Sea Snake and the Yellow and Black Sea Snake reportedly inflict fatal bites; information regarding other local species is lacking but they are all potentially dangerous.

2. The hood and bent neck instantly identifies a living cobra, although some harmless snakes flatten the neck slightly when frightened. Identification of a dead cobra may be more difficult. Stretching the skin of the neck is not a reliable test. The neck skin of most snakes will stretch when the specimen is fresh and limp. Later, because of stiffness, even the neck skin of a cobra cannot always be distended. If the head is not badly damaged, look for rather large, fixed fangs in the front of the upper jaw and a large third labial shield that touches both the eye and the shield bordering the nostril. These two characteristics positively identify a cobra. If unable to determine these points, look for the hood marking, then look on the underside of the neck ventral to where the hood should be. Cobras have wide dark bands here, often alternating with irregular cross bands of yellow or white; the rest of the body may be light, dark, or mottled. No harmless snake in India has such wide bands on the underside. (See description of cobra, page 95.) The King Cobra is restricted to the hill forests of the Southwestern Ghats, Himalayas and the mangrove forests of Bengal, Orissa and the Andamans. It is easily identified by its large size, yellow bands and distinctive inverted 'V' mark on the hood.

3. If the whole top of the head is covered with small scales irregularly arranged (see photograph), and the ventral scutes extend the full width of the belly (see photograph), the snake is a dangerously venomous viper.

The Saw-scaled Viper is common on the arid, open plains; Russell's Viper is found in small rocky hills, open jungle and thick hedgerows; the Levantine Viper is an uncommon snake found only in parts of Kashmir.

4. If there is a pit between the eye and the nostril (see diagram) the snake is a pit-viper, one of the 14 species found only in forested hills of India and the Andaman and Nicobar Islands. Although venomous, only exceptionally large specimens can inflict a fatal bite.

5. If the top of the head is covered with large shields, the vertebral scale row is definitely enlarged and the scutes on the underside of the tail are in a single row, the snake is a krait and very venomous. Additional features useful in identifying the Common Krait are:

- (a) It is a black or dark brown snake with white thin cross bands that often break up into spots on the anterior part of the body;
- (b) the eye is small and very dark, with pupil almost invisible; and
- (c) the loreal shield (see diagram) is absent.

The Banded Krait of northeastern India is distinctive by its prominent backbone and bold yellow and black cross bands of equal width. The other kraits are rare (see Checklist) and identifiable by the characters described at the beginning of point 5.

6. If the scales are in 13 or 15 rows, subcaudals paired, loreal shield absent and there is a pair of front fangs, the snake is a coral snake and venomous. Since nothing is known of the venom of India's five species, a large coral snake should be treated with caution.

7. Any Indian snake not fitting clearly into one of the foregoing six categories is nonvenomous.

Adapted from S. A. Minton's
'An Annotated Key to the Amphibians
and Reptiles of Sind and Las Bela'

Selected Bibliography

Banerji, R. N., *Therapeutic Advances in the Treatment of Poisonous Snakebite*, Proc. of the 4th International Congress of Toxinology, Tokyo, 1974.

Behura, B. K., *Snakes of Orissa*, Zoological Society of Orissa, 1966.

Bellairs, A., *Life of Reptiles*, Vols. I & II, Weidenfeld and Nicolson, London, 1969.

Bhanotar, R. K., R. K. Bhatnagar and Dr. K. Thakur, *Export of India's Wildlife and its Biological Significance*, Cheetal, Vol. 16, No. 3, 1975.

Biswas, S. and D. P. Sanyal, *A New Species of Wolf Snake (Lycodon) from the Andaman and Nicobar Islands*, Proceedings of the Zoological Society, Calcutta, 18: 137-141, 1965.

Bogert, C. M., *Dentitional Phenomena in Cobras and other Elapids*, American Museum of Natural History, Vol. LXXXI., Art. III, New York, 1943.

Bucherl, W. and E.E. Buckley, *Venomous Animals and their Venoms*, Academic Press, New York, 1971.

Caras, Roger, *Venomous Animals of the World*, Prentice-Hall Inc., New Jersey, 1974.

Deoras, P. J., *Snakes of India*, National Book Trust, New Delhi, 1970.

Deoras, P. J. and N. E. Vad, *Ecology of Echis carinatus*, Journal of the University of Bombay, 1956.

Deraniyagala, P. E. P., *Coloured Atlas of some Vertebrates from Ceylon (Snakes Vol. III)*, Government Press, Ceylon, 1955.

Ditmars, R. L., *Reptiles of the World*, Macmillans, New York, 1946.

Ditmars, R. L., *Field Book of North American Snakes*, Doubleday & Co., Inc., New York, 1949.

Dunson, W. A. (ed.), *Biology of the Sea Snakes*, University Park Press, Baltimore, 1975.

Fitzsimons, V. F. M., *Snakes of Southern Africa*, Purnell and Sons, Capetown, 1962.

Gans, Carl, A. d'Bellairs and T. S. Parsons, *Biology of the Reptilia, Vols. I-IV*, Academic Press, London 1969.

Gans, Carl, *Biomechanics*, J. B. Lippincott Co., Philadelphia, 1974.

Gharpurey, K. G., *Snakes of India*, Popular Book Depot, Bombay, 1937.

Kinghorn, J. R., *Snakes of Australia*, Angus and Robertson, Sydney, 1969.

Klauber, L. M., *Rattlesnakes*, University of California Press, 1956.

Kuntz, R. E., *Snakes of Taiwan*, U. S. Naval Medical Research Unit, Taiwan, 1963.

Leakey, J. H. E., *Observations made on King Cobras in Thailand*, Journal of the National Research Council of Thailand, Vol. 5, 1969.

McCollough, N. C. and J. F. Gennaro, Jr., *Evaluation of Venomous Snakebite in Southern U. S.*, J. Florida Medical Assoc. Vol. XLIX, No. 12, 1963.

Minton, S. A., *Annotated Key to the Amphibians and Reptiles of Sind and Las Belas, West Pakistan*, American Museum of Natural History, No. 2081, New York, 1962.

Minton, S. A. and M. R. Minton, *Venomous Reptiles*, Charles Scribners' Sons, New York, 1969.

Murthy, T. S. N., *Some Snakes from the Annaimalais and Cardamom Hills*, Journal of the University of Poona, 1971.

Nicholson, E., *Indian Snakes*, Higgonbotham & Co., Madras, 1870.

Parker, H. W., *Natural History of Snakes*, British Museum (N.H.), London, 1965.

Peters, J. A., *Dictionary of Herpetology*, Hafner Publ. Co., New York, 1964.

Pitman, C. R. S., *Snakes of Uganda*, Codicote, Wheldon & Wesley Ltd., London, 1974.

Pope, C. H., *The Giant Snakes*, Routledge and Kegan Paul, London, 1961.

Porter K. R., *Herpetology*, W. B. Saunders Co., London, 1972.

Rajendran, M. V., *Our Country's Snakes* (Tamil), Vel Printers, Palyamkottai, 1968.

Reichenbach-Klinke, H. and E. Elkan, *Diseases of Reptiles*, T.F.H. Publications, New Jersey 1965.

Reid, H. A., *Venomous Animals and their Venoms* (W. Bucherl *et al.*, eds.), Academic Press, New York, 1968.

Romer, A. S., *Osteology of the Reptiles*, University of Chicago Press, Chicago, 1968.

Rose, Walter, *Reptiles and Amphibians of Southern Africa*, Maskew Miller, Capetown, 1962.

Russell, F. E. and R. S. Scharffenberg, *Bibliography of Snake Venoms and Venomous Snakes*, Bibliographic Associates Inc., California, 1963.

Russell, Dr. Patrick, *An Account of Indian Serpents Collected on the Coromandel Coast*, Shakespeare-Press, London, 1796.

Sawai, Y. *et al.*, *Epidemiological Study of Snakebites in Southeast Asia*, Japanese Journal of Experimental Medicine, Vol. 42, No. 3, 1972.

Sawai, Yoshio and Manabu Homma, *Snakebites in India*, Publication of the Japan Snake Institute, Vol. 7, 1975.

Sharma, B. D. and T. Sharma, *Snakes of Jammu and Kashmir*, Newsletter of the Madras Snake Park Trust, Vol. I, No. 2.

Shaw, C. E. and Sheldon Campbell, *Snakes of the American West*, Knopf, New York, 1974.

Singh, L. *et al.*, *Chromosomes and the Classification of the Snakes of the Family Boidae*, Cytogenetics 7/3, 1968.

Smith, H. M., *Snakes as Pets*, T. F. H. Publications, New Jersey, 1965.

Smith, M. A., *Monograph of the Sea Snakes*, British Museum (N. H.), London, 1926.

Smith, M. A., *Fauna of British India, Vol. III Serpentes*, Survey of India Reprint, Dehra Dun, 1961.

Steward, J. W., *Snakes of Europe*, David and Charles Ltd., Great Britain, 1971.

Stidworthy, J., *Snakes of the World*, Paul Hamlyn, London, 1969.

Taylor, E. H., *Serpents of Thailand*, Univ. of Kansas Bulletin, XLV, No. 9, June, 1965.

Terent 'ev, P. V., *Herpetology*, Israel Program for Scientific Translations, Jerusalem, 1965.

Underwood, G., *A Contribution to the Classification of Snakes*, British Museum (N. H.), London, 1967.

Visser, John, *Poisonous Snakes of Southern Africa*, Howard Timmins, Capetown, 1964.

Wall, Major F., *Poisonous Terrestrial Snakes of British India*, Bombay Natural History Society, 1928.

Waltner, R. C., *Geographical and Altitudinal Distribution of Amphibians and Reptiles in the Himalayas*, Parts I-IV, Cheetal, Vol. 16, Nos. 1, 2, 3, 4, 1975.

Whitaker, R., *Bites of Echis carinatus*, J. Bombay Natural His. Society, 67 (2), pp. 335-37, 1970.

Whitaker, R., *Pit Viper Bites at a South Indian Tea Estate*, JBNHS, 70 (1), 1973.

Worrell, Eric, *Dangerous Snakes of Australia and New Guinea*, Angus and Robertson, Sydney, 1963.

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